THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXXI. No. 787.] LONDON, JUNE 11, 1878. [30TH YEAR.] Price 6d.

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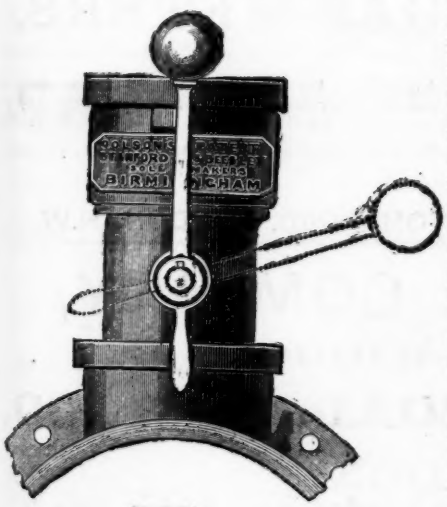

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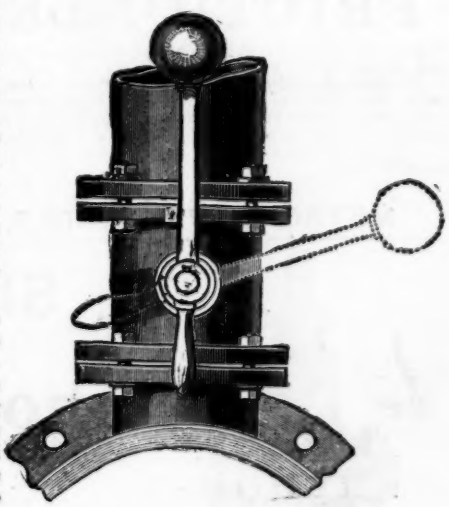

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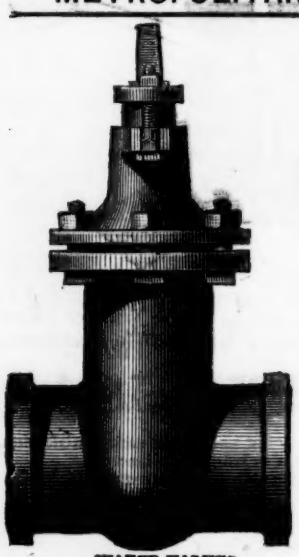

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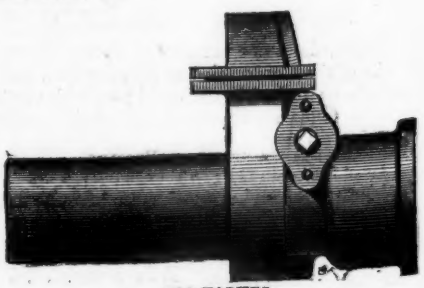

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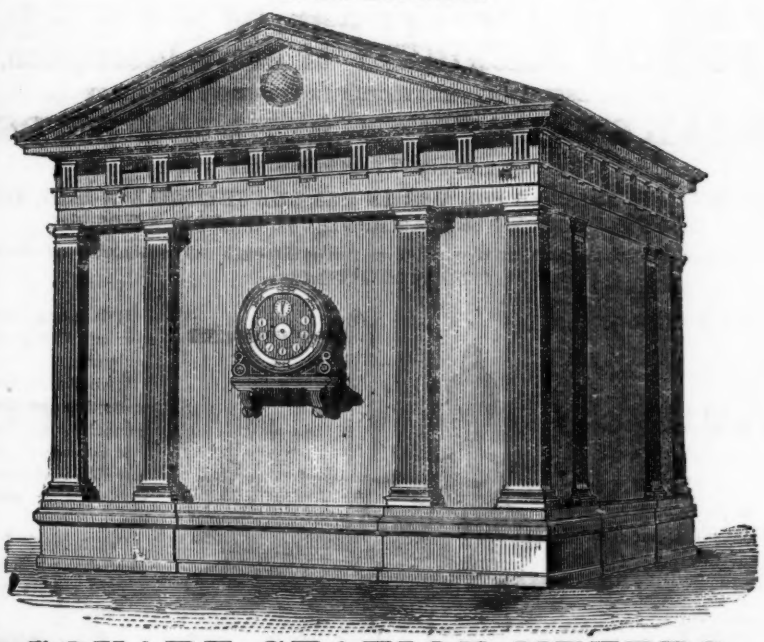

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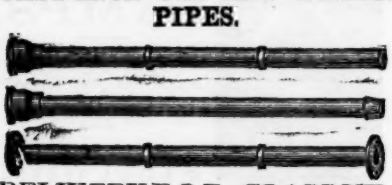

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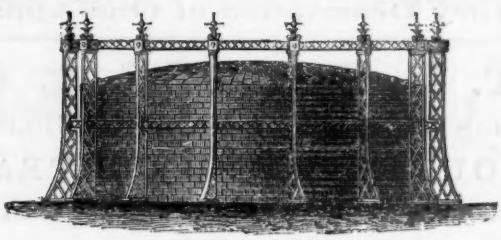

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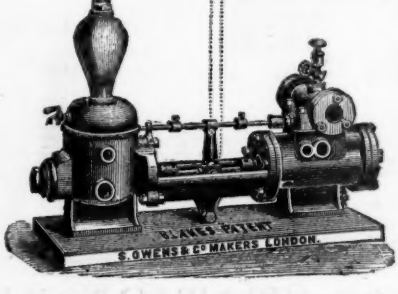
SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF
BLAKE'S PATENT STEAM-PUMPS,
More than 10,000 in use,
ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.
The following are some of the prominent advantages of the BLAKE PUMP:—

It will start at any point of stroke.
It has no dead point.
It works fast or slow, with the same certainty of action.
It is economical. Has a lead on the slide-valve.
It is compact and durable.



It is interchangeable in all its working parts.
It will deliver more water than any other pump.
It is made of best materials in the most workmanlike manner.
Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

SOLE MANUFACTURERS OF
MANN & OWENS
IMPROVED PATENT GAS-VALVES.
PRICED LISTS AND FULL PARTICULARS FURNISHED ON APPLICATION.

TANGYE BROTHERS AND HOLMAN,

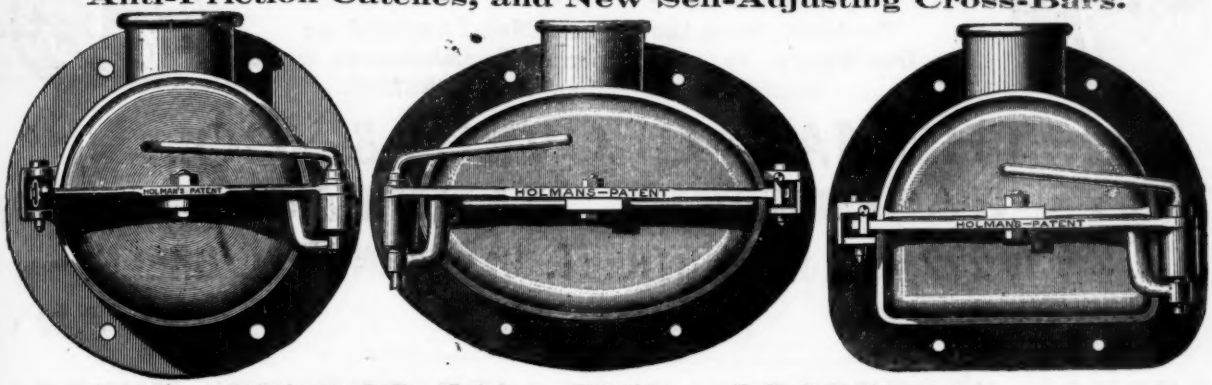
CORNWALL HOUSE, 35, VICTORIA ST., LONDON, E.C.

(LATE OF 10, LAURENCE POUNTNEY LANE.)

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

D and Oval Morton's Lids are working satisfactorily both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

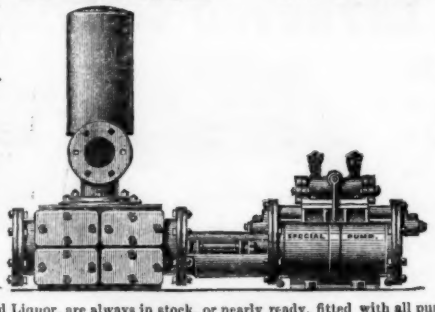
Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851 New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

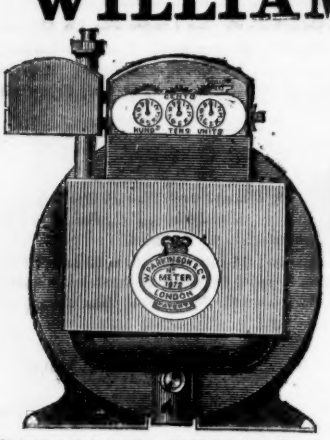
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.,



(ESTABLISHED 1816,)

MANUFACTURERS OF

WET & DRY METERS,

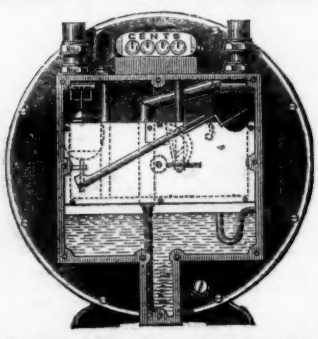
STATION-METERS & GOVERNORS,

EXHAUSTER REGULATORS,

PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

INQUIRER.—*A Provisional Order under the Gas and Water Works Facilities Acts incorporates the Gas-Works Clauses Acts, 1847 and 1871, but not necessarily the Companies Clauses Act; and where it does not, the accounts of the Company may be balanced, and dividends paid, yearly or half yearly, at the option of the Directors, or as may be agreed upon by the Shareholders in general meeting.*

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 11, 1878.

Circular to Gas Companies.

ABOUT the practical value of exhibitions of gas apparatuses, in popularizing the use of gas, we have no doubt whatever. The results may not be immediately apparent, but we make little question that at South Shields the use of gas has already been extended since the exhibition projected by the Gas Company. In this Metropolis we experience a difficulty. In many of our leading thoroughfares apparatuses for the consumption of gas for culinary and heating purposes are to be found in shops; but these expositions do not bring the actual value of the apparatus home to the gazer's mind. Explanation and demonstration are wanted, and this the shopkeeper does not always afford. Thus possibly a gas exhibition of a popular character might prove of use even in this vast Metropolis. We do not, of course, forget that a very fair collection of cooking and heating apparatuses was exhibited in one of the abortive displays that have taken place at South Kensington. Naturally but little attention was paid to it, and, so far as the interests of Gas Companies were concerned, the exhibition fell flat. Exhibitors were disappointed, and we question whether Gas Companies profited. We hesitate to suggest a Metropolitan exhibition; but every Gas Company might, perhaps, do something for themselves. Not only gas is to be thought of, but the consumption of coke as well. We may have entered upon a cycle in which warm winters will prevail for many years to come; but coke must be got rid of in some way or other, and in winter, warm or not, people like to have a cheerful fire. Thus it is to the interest of Gas Companies first of all to promote the sale of their finished product, and then to dispose of their chief residual.

Whatever may be the financial results of the Exhibition of Gas Apparatus just brought together by the Corporation of Birmingham, there is no question that, as a display, it was a great and complete success. We leave our Special Correspondent to deal with the details of the exhibits, and here simply give a general view of the entire collection. All the leading manufacturers of apparatuses for the use of gas, other than for illuminating purposes, were well represented, but it is needless to say that cooking-stoves were in the majority. Of these we had every variety, from a range adapted for a nobleman's mansion, or a large hotel, down to the inexpensive apparatus, by means of which a provident artizan could do all the cooking necessary for his family at an expense of about three-halfpence per day. The dingy Town Hall, looking perhaps dingier than ever, was not made brilliant by the display, and a strong smell of half-burnt gas, and more than half-burnt fat, resulting from the meat-bakings going on, did not add to the attraction. Burnt fat, however, is the inseparable accompaniment of baking and roasting operations. We have, perhaps, hypercritical olfactory nerves, but we do wish that manufacturers would arrange for an adequate supply of air to their mixed flames, for the smaller apparatuses are used in close rooms, where the stench of acetylene would be unbearable. But, after all, the cooking apparatuses formed a noble display, highly creditable to the manufacturers, and destined, we believe, to greatly increase the consumption of gas. Other useful inventions were not omitted. The poor laundress could have seen cheap apparatuses for warming flat-irons, and the solderer for his copper-bits. Lacquering-stoves were well represented. Gas-engines did not form so prominent a part of the display as we could have wished in such a place as Birmingham, but several found a place in the exhibition. Cheerful heating-stoves and coke-stoves were, of course, abundant, and will, no doubt, receive the full attention of our reporter. Passing to the gallery, we found many objects of interest. There was a splendid display of gas-burners, which, however, required fuller explanation than was vouchsafed to us. The Birmingham public, an examination of the shop windows showed us, require instruction in the use of burners. We saw fishtails burning jet fashion, and bat's-wings showing two horns of flame, which suggested to us that the Corporation might have an energetic Inspector or two to teach shopkeepers how to keep their burners in order. Among other objects of interest was a very complete display of residuals, and products manufactured therefrom, collected by the Gas Engineers. Pressed into the service was the pile microphone, which found its place there by virtue of the plate of coke used in the battery; and that reminds us to ask what electricians will do for the dense coke they require when anti-dip pipes and improved exhausters have completely prevented the deposition of carbon in retorts. We may end this notice here with the remark, that the Corporation deserve the thanks of their customers and the public generally, for affording them this opportunity of becoming better acquainted with the uses of gas. We hope manufacturers will profit by it; but we are sorry to say that, on the two high-priced days, the Exhibition was not so well attended as we could have wished to see it. Whether the artizan class availed themselves of the cheaper rates, we shall learn in due time from our special reporter.

As there is a great Exhibition in Paris, Directors of Gas Companies and Gas Committees of Corporations have been smitten with the idea that they might learn something by a visit to the Paris Gas-Works. There is, indeed, a good deal to be learnt by a visit to those works, but not by a walk round, occupying, perhaps, not more than a couple of hours. Among others who have thought this a convenient time for gathering information in the French capital were the Gas Committee of the Corporation of Manchester, whose stay must have been short, or their wants moderate, for their trip only cost the ratepayers £200. Let us hope that the Committee will be liberal to their Gas Managers, and allow them sufficient time and money to attend the forthcoming meetings of the British Association, and also to pay a serviceable visit to Paris. The moment is made opportune by the meeting of the Société Technique, and we hope that Corporations and Companies will alike allow their officers time and means for a visit.

The wild scheme for the manufacture of illuminating gas from sewage is, it would appear, to receive an extended trial at Worcester, the Corporation of which city have granted to the inventor of the process as much sewage as he may choose to take for his purpose. We are, of course, not at all sorry to learn that a trial is to be made on a larger scale, and if it should succeed, we shall not in the least envy Mr. Stephan. Cheap and good gas would be such an immense boon to the whole community, that, let it come from what source it may, it must be welcome.

We believe it will continue to come from coal, and will never cost much less than it does at present; but we shall see.

The subject of commissions has dropped out of notice for some time; but, so far as Gas Managers are concerned, it is revived in a letter which we publish in another column. The point, which arose in a trial that took place in the Queen's Bench Division of the High Court of Justicee, was the legality of the acceptance by an Engineer employed by one party, of a commission from another party doing contract work for his employers, under his superintendence. The Court ruled that receiving what are practically bribes was at once illegal and immoral, and the Judges expressed their opinion in very emphatic terms. Our readers know what our ideas on the subject are. We have never attempted to justify the practice of taking commissions, but we have pointed out that, while Gas Managers continue to be paid such miserably small salaries, the temptations to accept commissions on whatever is bought must be exceedingly strong. After all, a manufacturer who offers the bribe must be considered the more blameworthy party; but, in these days of fierce competition, there is even an excuse for him. Let us hope that, as time rolls on, better principles will prevail; that Gas Companies and Corporations will pay their officers more liberally, and these latter will cease to be tempted.

Carbonic acid is certainly not a statutory impurity in gas; but its presence therein is so prejudicial to the interests of a Gas Company, that every care is taken to remove as much of it as possible. A little, however, generally passes on, and whatever injury it may do is, as we have said, a prejudice to the Gas Company. The quixotic Medical Officer of Health to the Chelsea Vestry finds grave fault with the London Company for allowing the presence of a small per centage of carbonic acid. The fact, nevertheless, remains, that the public in that Company's district are supplied with much richer gas than is required by statute. Medical Officers, however, must do something for their money, and we suppose it is their especial business to find grievances, and, if necessary, to make them. It should be mentioned, that the Vestry have instructed their Solicitor to have the gas-works at Fulham watched for the next three months. What this sort of *espionage* costs the ratepayers we are unable to say; but, whether the sum be great or small, we are perfectly certain that no adequate benefit results from the expenditure.

After a great deal of discussion, the Town Council of Rochdale have agreed, by a considerable majority, to increase the salary of their Gas Manager. The motion was, of course, opposed; for there are severe economists in the Council—men who evidently think that a Gas Manager's remuneration should be kept as low as possible. However, as more than the £100 a year is to be saved by altering the remuneration of the lamplighters, the opposition was not very strong.

The Town Council of Hereford have also had before them the question of an increase in their Gas Manager's salary, and also an application for extra remuneration while the new works are being constructed. The Council declined to raise his salary, but agreed to pay the Manager a commission of two and a half per cent. upon the outlay on the new works. As from £20,000 to £30,000 will be expended in this direction during the next five years, a comfortable addition will be made to his income.

In the Halifax Town Council the same question has cropped up, it having been proposed to raise the Gas Manager's salary to £400 a year. Here, as usual, the hard-headed and harder-fisted Yorkshireman turned up, who thinks it is always inopportune to raise salaries, seeing that large salaries generally prove the ruin of their recipients. However, a sufficient number of Councillors were more generously disposed, and the increase was carried. Thus we are happy to say that some Managers will be able to come up to the Association meeting with heavier purses and lighter hearts than usual. But really, on reading some of these Town Council discussions, we wonder that any man of honour, skill, and experience can be persuaded to serve a Corporation.

Water and Sanitary Notes.

The Thirlmere Scheme is beyond doubt shelved for the present session; but it will be revived in the next, with, we fear, no increased prospects of success. What alterations the Water Committee of the Corporation of Manchester may see fit to introduce into the Bill we cannot say; but we hope it will be presented much in the form into which it was moulded by the Select Committee of the House of Commons. We think it important that provision should be made for the supply of towns along the line of aqueduct, and cannot understand the objections raised to this by the opponents of the scheme in the Manchester Town Council. The great store of water in our northern lakes belongs, it may be said, to the whole country, and to give any one city or district a monopoly of it would be a great injustice. We still hope to see the scheme carried out, but confess to a fear that there is in the House of Lords an opposing party of great influence.

The South Kensington clique mustered strong at Stafford House on the 3rd inst., in order to give Major—we beg his pardon—General Scott (men get on so fast in the army, when they have civil employment and never see a shot fired, that it is difficult to keep up with the promotions) one more puff. He is now at Burnley, professedly converting the sludge of sewage clarified with lime into something which, by a figure of speech, perhaps, is called Portland and Roman cement. The scheme was tried at Birmingham, we believe, under the personal superintendence of Sir Henry Cole, C.B., who was the oracle at Stafford House the other day; but we have not yet heard how many tons of cement were made at Birmingham, nor what was the quality of it when produced. We have met with specimens of sewage cement, and found that when made into blocks it had, as an eminent engineer said, the strength of oat cake. The sale of a few tons of cement of such quality as would be of any use to a builder or a contractor would do more to promote the use of General Scott's process than any number of Stafford House meetings, and exhibitions of sewage sludge by Sir Henry Cole, C.B. We fear that at present Local Authorities cannot be advised to adopt this plan for treating their sewage; for, so far, it has produced no profitable results. The clarification of sewage by lime is a very old invention; it was tried on a large scale by Mr. Wicksteed, at Leicester, but he could make nothing of his dried residue. Perhaps sewage cement and sewage gas may be put in the same category.

Whatever profit may result to Burnley from the adoption of the Scott process, the choice between cement manufacture and sewage farming, so far as making profit is concerned, is not very great. In these days, however, it is fully admitted that the material, which was once seriously regarded as a mine of wealth, is now a substance which ratepayers must be content to pay to get rid of. West Derby has a sewage farm, out of which it once fondly dreamed of getting a good revenue. It has, however, sadly disappointed the hopes of its projectors. More and more money is expended every year on works, but the farm cannot be made to pay its expenses. It seems in past times to have been rather badly managed; but, even at the best, the result was far from what was expected. The West Derby people are no worse off than the majority of Local Authorities who have sewage farms. There are, however, believers firm in the faith that sewage farms will ultimately be made sources of profit. Among these is Mr. Donaldson, M.A., who recently read a paper to the Members of the Sanitary Institute of Great Britain. He says, with perfect truth, that irrigation offers the best means of purifying sewage—that is, we may add, if it be properly carried out, and the water be passed through the land, and not simply over it.

That no chemical process completely purifies sewage, every one is fully aware; but still, it is not always possible to irrigate, and a chemical method may be employed to bring the sewage into a condition which will justify its admission into a stream. It is true that chemical treatment has always entailed a loss, and will probably continue to do so until some happy chemist discovers a cheap precipitant of dilute ammonia and phosphates.

Lord Redesdale has been dealing with the Cardiff Water Bill with rather a high hand. The measure came before his lordship unopposed; but, though not objected to by the Cardiff Corporation, it did not meet Earl Redesdale's views. It is, among other things, to sanction an arrangement entered into by the Corporation with the Water Company for the transfer of the undertaking of the latter. In Lord Redesdale's opinion, however, the terms agreed upon are too high, and on that account he hesitates to pass the measure. Surely the powers of a Chairman of Committees are being somewhat overstrained when he objects to pass a private Bill which all the parties concerned assent to.

The Liverpool Land and House Owners Association are naturally alarmed at many of the provisions of the Public Health Bill, which, if arbitrarily carried out, will render some lands, and also house property, unless of good description, a very undesirable form of investment. The Sanitary Acts at the present time press very hard upon the houseowner. The Public Health Act, which will require a landlord in a rural district to obtain for his tenant a supply of pure water, which, it may be, could only be procured at great expense, may ruin not a few of the owners of cottage property in the kingdom. We are, therefore, not surprised that the Liverpool Association of House Owners have taken action, and petitioned the Lords against the Bill. Parliament would have been inundated with petitions from all parts of the country,

but for the fact that most of those whose interests are concerned have heard nothing of the measure.

We conclude to-day our report of the proceedings before the Select Committee of the House of Commons on the Nottingham Water Bill. These present some points of much interest. Mr. Michael, Q.C., who succeeded in getting auction clauses inserted in the Bill of the Grand Junction Company, tried hard in the case of the Nottingham Company to persuade the Committee that such clauses were scarcely admissible into a Water Bill, but he was not successful in carrying his point. The Company failed in another matter, and that was the amount of new capital to be allowed. Upon all other questions in dispute the Company must be considered to have triumphed, as they deserved, for the Corporation could allege no complaint against them. The Company have now a new lease of life, and that is all we care about.

There seems to be a question at Henley-on-Thames whether water-works shall be constructed by the Local Board or by a private Company. Alarmed by a resolution of the Local Board, which committed them to make and maintain water-works, a meeting of the inhabitants was called, at which, as we read the report, the proposition of the Board was unanimously condemned. We are afraid that, as a matter of fact, the water supply of Henley is not particularly good; it comes, for the most part, from shallow wells, which are often seriously polluted—that is, in the opinion of modern sanitarians. Henley is, however, a very healthy place notwithstanding; still a liberal supply of pure water would be a blessing, even in that cheerful little town. But then comes the bugbear– water-works established, sewerage works must, in some people's opinion, follow. What come after them every ratepayer knows—a mountain of debt and rates proportionate. It does not follow that sewerage works should be the inevitable accompaniment of water-works. If the inhabitants will abstain from water-closets, they may get rid of their refuse water by channels cheaply constructed, the contents of which, at Henley, might be at once discharged into the river without offence. We advise the ratepayers to allow the Company to proceed, and leave the Local Board to attend to their own particular functions. A Company can only charge the inhabitants for the water supplied, and no one is compelled to take it; but under the Public Health Act, any Local Authority may compel a consumer to take the water supplied by such authority, who may charge practically what they please for it, and then levy rates to make up deficiencies.

EXHIBITION OF GAS-STOVES AND HEATING APPLIANCES AT THE TOWN HALL, BIRMINGHAM.

Since the collection of gas apparatus exhibited under the auspices of the Gas-Fitters Association in 1851, at the Polytechnic Institution, London, no display of the kind has taken place approaching in completeness the assortment which has been on view at the Town Hall, Birmingham, during the last few days, and great praise is due to the various manufacturers for the hearty manner in which they responded to the invitation of the Gas Committee of the Corporation. The articles exhibited and intended for competition comprised eleven distinct classes, of which seven were devoted to cooking stoves, the remaining four including baths, heating stoves, appliances for general and trade purposes, steam-boilers and engines actuated by gas, and stoves for the use of coke as fuel.

The bulk of these exhibits occupied the floor of the great hall and the adjoining corridors. In the galleries were arranged a variety of meters, burners, test-gasholders, models of gas-works, specimens of products derived from the residuals, and other objects and appliances connected with the manufacture and use of gas. But the main object of the Committee in organizing the exhibition, was to bring together all the apparatus connected with gas, as applied to cooking, heating, and ventilation, and as a source of heat for manufacturing purposes, and the award of prizes was restricted entirely to the articles exhibited within these limits.

Commencing with the section devoted to cooking, the principal exhibitors were Messrs. Billing and Co., of London; Hassall and Singleton, of Birmingham; Leoni and Co., of London; W. H. Marklew, of Birmingham; Davis and Son, of Bath; T. Nock, of Birmingham; J. E. Prust, of Birmingham; Scott, Brown, and Co., of West Bromwich; Chas. Wilson, of Leeds; J. Williamson, of London; and J. Wright and Co., of Birmingham. There were also a number of other manufacturers.

The mode of applying the heat in the stoves and ranges may be divided into two classes. As regards the roasting chambers, in one class the heat was reflected from above on to the meat below. In using the gas in this manner, although the cooking process appears to be effected in a satisfactory manner, still, to secure the necessary uniformity of colour and browning, the joint has to be turned over very frequently, and needs basting, which requires the attention of the cook. In the other class of stoves, where the burner is placed at the bottom of the chamber, and the joint suspended above, it is completely enveloped in an atmosphere of heated air, and every part of the meat is exposed to the same temperature at the same time. This arrangement seems to comply more effectively with the requirements of perfect and uniform roasting than where the heat is reflected upon only one side of the meat at a time.

It must, however, be admitted that the reflecting stove has the advantage of using the heat more advantageously for baking purposes, as the pastry or other viands intended to be baked are placed in a separate chamber, and are very efficiently cooked; but in cases where it is desired to roast only, or to bake only, there is no question that the enclosed stove, heated by a single burner below, is the most perfect mode of using the gas, and, at the same time, the most effective as a cooking agent.

The system under which the gas was burnt varied considerably. In some stoves pure gas was used; in others an admixture of air and gas was adopted. It is obvious that in the latter arrangement great attention is necessary to secure a proper admixture, and in cases where reduced heat or small consumption is only required, the burners employed with the aërated gas are not so manageable as those in which pure gas is used. The chief recommendation of the mixed air and gas system is its cleanliness. Some of the stoves for boiling and frying were upon a new system of construction, so arranged as to heat the gas to a very high temperature before mixing it with the air, and before its ignition. The advocates of this arrangement claim for it greater economy in the quantity of gas consumed and a higher heating power, but it is very questionable if these advantages are not more apparent than real, as the actual heating effect can only be in accordance with the weight of the material burnt, irrespective of its volume or bulk; or, in other words, the true calorific effect is represented by the amount of hydrogen converted into aqueous vapour, and carbon into carbonic acid.

Before dismissing the cooking-stoves, it may be desirable to point out the tendency there is on the part of some manufacturers to contract the size of their stoves by crowding into a small space too many separate ovens or hot closets. This is an error. English families of the lower and middle classes generally make a single joint the chief feature of their every-day dinner, and only look upon *entrées* or pastry as adjuncts; therefore, be it an open grate, a close oven, or a gas-stove, either is only suitable when it is large enough to cook the family joint. Many of the gas-stoves at Birmingham, although displaying great ingenuity in the arrangement of their several parts, were still defective, because the roasting chamber was too small, its space having been contracted in order to provide a separate oven or a hot closet.

The stoves exhibited in Classes 1 and 2, by Messrs. J. Wright and Co., Leoni and Co., C. Wilson, and Davis and Son, were good examples of stoves, where simple roasting or baking and boiling are the chief features of the cooking requirements of an ordinary English family. For those who require more elaborate culinary arrangements, some stoves exhibited by Messrs. Billing and Co., Scott, Brown, and Co., and Wright and Co., deserve special commendation for their general arrangement, excellence of workmanship, and moderate price. In complete kitcheners, the gas-cooking range of Mr. C. Wilson, of Leeds, was an excellent specimen of the class, and perfectly adapted to the requirements of a large family, or boarding school. A large kitchener, exhibited by Mr. T. Nock, of Birmingham, possessed many points worthy of commendation; but its efficiency was considerably impaired, owing to the absence of any adequate provision for a supply of hot water. In this class, some stoves by Messrs. Billing and Co. obtained a prize, and are to be commended.

In the class of stoves adapted for very large hotels, public establishments, hospitals, or asylums, a set of apparatus exhibited by Messrs. Leoni and Co. was most deservedly first. The excellence of design and sterling quality of the material and workmanship, should render it one of the most efficient gas-cooking arrangements at present in use. Messrs. Leoni also exhibited several very beautiful stoves for the use of ladies who may desire to become practically acquainted with the art of cooking. The one called the "Lady's Favourite" is so neatly arranged as almost to induce the fair sex to become cooks for the sake of using so pretty a contrivance. Messrs. Leoni and Co., Billing and Co., Messrs. Scott, Brown, and Co., and J. Wright and Co., were specially strong in stoves adapted for use as accessories in the kitchens of large houses, but in some of the exhibits there was not that attention to the arrangement and position of the burner in the roasting chamber, which is necessary for obtaining the best results. The great defect in some of the stoves consisted in allowing too large an air space at the bottom, and not bringing the air more directly into contact with the flame.

In the class devoted to the exhibition of stoves to be used by workmen and artizans, the one exhibited by Mr. J. E. Prust, of Birmingham, and for which the prize in this class was awarded, is quite a marvel of simplicity and cheapness, the cost being only 8s. 6d., including the kettle for hot water. Nearly every exhibitor had stoves in this class, some more expensive than others, but all of them of considerable merit.

The chief feature in the bath class was a contrivance by Mr. W. Puckett, of Marlborough Street, London. It consists of a portable gas-heater, which is directly immersed in the bath, on the same principle as the bath-heater used in many parts of the Continent, where ignited charcoal is used. The quantity of gas consumed to heat the test quantity of water was very small, and where time is not of much consequence this heater appears to be a very economical method of obtaining warm water. Messrs. Strode and Co. exhibited one of their improved circulating heaters, and Messrs. Scott, Brown, and Co. one on a new principle, that very rapidly raised the temperature of the water passing through it.

In Class 9, for heating-stoves, Messrs. Billing and Co., J. Wright and

Co., and Leoni and Co. exhibited some extremely handsome designs, especially the latter firm. The most noteworthy were some stoves in which a fire-resisting composition, with small fragments of platina distributed in it, which after being intensely heated, glows so as to form a very beautiful imitation of an open fire. These stoves throw out a considerable amount of heat. But the most effective and cheerful-looking gas fire was the one exhibited by Mr. E. W. Ball, of Birmingham, where the effect is obtained by three mixed air and gas burners, the flames from which pass through a specially prepared material, which as soon as it becomes heated glows with a bright red appearance, and from which a very large amount of heat radiates. As a gas fire in an ordinary grate it is exceedingly effective.

In Class 10 there were a considerable number of exhibits, the most prominent being the gas-engines of Messrs. Louis Simon and Son, of Nottingham, and the Crossley engine exhibited by Messrs. John Wright and Co. The former is a very ingeniously constructed machine, and is worked by a combination of gas and steam, but does not appear to be so economical as some other engines, and is not so simple in its construction. The prize in this class was awarded to the Crossley engine. As a specimen of steam boiler and engine in which the heating principle was gas, an American engine, exhibited by Mr. W. A. Comber, of Birmingham, was the most efficient, and deservedly received a medal. The other exhibits in this department, except for excellence of workmanship, presented no features of novelty.

The class devoted to the exhibition of stoves designed to use coke was very meagrely filled, and none of the exhibits were of any special importance.

This class closed the Exhibition proper; but in the galleries, spaces were allotted to the following, among many other Exhibitors:—Messrs. W. Parkinson, of Cottage Lane, London, exhibited a case containing a very superior collection of the meters and other gas appliances for which their firm has so long been famed; Messrs. W. and B. Cowan exhibited, among other articles, working models and specimens of Foulis's patent governors; Messrs. Blews and Son, Messrs. Henry Greene and Son, Messrs. George Glover and Co., and Messrs. John Bent and Son, all exhibited some very excellent specimens of meters, test gasholders, testing apparatus, and other specialities.

A very prominent feature in this department was the new and powerful Argand burner exhibited by Mr. William Sugg. It may safely be asserted that electric lights will scarcely be required in any situation where a supply of gas for one of Mr. Sugg's burners can be obtained.

Another great attraction in this department were the models exhibited by Mr. Charles Hunt, of the Windsor Street gas-works, Birmingham. They were unquestionably the most complete and unique series of models of a gas-works ever exhibited, and reflect the highest credit on their designer, and the workmen who constructed them.

A very interesting part of this collection consisted of a variety of burners, arranged in order of merit from the most effective to the most defective. These well deserved the careful study of every one who visited the Exhibition. Near to them were displayed a complete series of chemical products obtained from the residuals—coke, tar, and ammonical liquor.

The whole Exhibition reflected the greatest credit on all engaged in its organization. Both the Committee and the Officers of the Gas Department have been indefatigable in their endeavours to carry out the design in the most effective manner, and it is quite certain that the Corporation of Birmingham have come forward in a very spirited manner to promote the use of gas in every practicable form. The jurors, we understand, had a very arduous and onerous duty to perform in awarding the prizes; but we believe their selection has met with general approval. The names of the jurors were Mr. H. Gore and Mr. F. W. Hartley, of London, and Mr. C. Hunt, Mr. H. Hack, and Mr. J. Wood, of the Corporation Gas Department. Large numbers of visitors were present on each day, and a very respectable audience attended the School of Cookery Lectures given at intervals during the day and evening.

The following is the award of the Jurors:—

Town Hall, Birmingham, June 6, 1878.

To the Exhibition Sub-Committee of the Gas Department, Corporation of Birmingham.

Gentlemen,—We, the Jurors appointed by you to determine the merits of the various exhibits, and make the awards thereupon, have the honour to report that, after having examined the various apparatus comprised under the eleven competitive classes, and having made comparative tests with many of them during a period extending over Tuesday, Tuesday night, the whole of Wednesday, and a portion of to-day, have made the following awards:—

Class 1.—Cooking Apparatus suitable for the house of an artizan.
The Apparatus to be inexpensive, simple in construction, compact and durable, to be capable of cooking, at a moderate cost, the daily meals of a family of from four to eight persons.
Exhibitors to be prepared to show, by practical work, what can be done with a consumption of 10, 20, and 30 cubic feet of gas.
Medal—J. Wright and Co.
Honourable Mention—S. Leoni and Co.

Class 2.—Cooking Apparatus adapted to the requirements of a family of from four to eight persons.
The Apparatus to be capable of cooking the daily meals, including dinner of roast meat, two kinds of vegetables, and pudding; and also to provide for a sufficient supply of hot water for cleaning-up purposes, and of boiling water for tea—its selling price not to exceed £3 3s.
Medal—Charles Wilson.
Honourable Mention—E. Millington.
Honourable Mention—J. Williamson.

Class 3.—Cooking Apparatus adapted to the requirements of a middle-class family of from six to ten persons.
The Apparatus to provide for roasting, grilling, baking, boiling, stewing, frying, and toasting, and for the supply of hot water.
Medal—Scott, Brown, and Co.
Honourable Mention—J. Wright and Co.
Honourable Mention—Billing and Co.

Class 4.—Complete Family Kitchener, adapted to the requirements of a family of from ten to fifteen persons.
This Apparatus to be sufficient for all the cooking, and also for the supply of hot water for kitchen.
Medal—Charles Wilson.

Class 4A.—A similar Apparatus, with the addition of a supply of hot water for bath and lavatory.
Medal—Billing and Co.

Class 5.—Complete Cooking Apparatus, adapted to the requirements of hotels, clubs, schools, hospitals, &c.
Medal—S. Leoni and Co., Complete Apparatus.
Honourable Mention—Billing and Co., Apparatus and Cooking Utensils.

Class 6.—Cooking Apparatus to be used as an accessory in kitchens of large houses, where a coal or coke fire is also intended to be used.
Medal—S. Leoni and Co.

Class 7.—Cheap Workman's Stove, for cooking in the workshop.
Medal—J. E. Prust.

Class 8.—Baths heated by gas. Quickness in heating, cost, and least consumption of gas to be considered.
Medal—Ewart and Son.
Honourable Mention—W. Puckett.

Class 9.—The most cheerful and effective Gas Fire, with the least consumption of gas.
Medal—E. W. Ball.
Honourable Mention—Billing and Co., General Effectiveness and Artistic Merit.
Honourable Mention—S. Leoni and Co., Originality and Effectiveness.

Class 10.—Apparatus for Manufacturing or Trade purposes; and Miscellaneous Apparatus.
Medal—J. Wright and Co., *Otto* Silent Gas-Engine.
Medal—W. A. Comber, American *Baxter* Steam-Engine, Gas-Heated Boiler.
Honourable Mention—J. Wright and Co., Excellence in Stoves for Tailors, Hatters, Laundresses, &c.

Class 11.—Coke Stoves for Domestic purposes.
Medal—T. D. Clare.
Honourable Mention—J. Wright and Co., Excellence of Design and Construction.

We recommend that a certificate of Honourable Mention be awarded to Messrs. Hassall and Singleton, for substantial construction and general appearance of the stoves exhibited by them.

We have to express our great satisfaction at the meritorious character of the exhibits generally, which, while it enabled us to award all the medals at our disposal, made the task of selection in some cases a matter of extreme difficulty.

(Signed) Henry Gore,
F. W. Hartley,
Chas. Hunt,
Henry Hack,
James Wood.

Communicated Article.

WATER GAS.

(*Continued from p.* 832.)

From the time of Val Marino's patent until the introduction of the Kirkham furnace, it may certainly be said that there was no marked departure from the old and faulty track. It was in 1852 that Messrs. John and Thomas Nesham Kirkham took out their first patent (No. 14,238) for "Improvements in the manufacture of gas for lighting and heating;" which improvements consisted mainly "in the mode of obtaining gas by the decomposition of water in close furnaces."

It has been said that the proper place to burn the fuel for generating steam is inside the boiler, and not under or around it, and the method of effecting this object has been with some a subject of serious consideration. We know, as a matter of fact, that it has not yet been accomplished, and we do not believe that its advent is very near, but the process described by Messrs. Kirkham was a movement in that direction. Hence the results achieved far exceeded anything that had previously been attained, the proof of which is the large amount of carbonic oxide and the small amount of carbonic acid produced, a result which until the recent revival of the system in America was considered to be its great fault.

No doubt Messrs. Kirkham had in their minds the functions of the foundry cupola and smelting furnace when the mode of working was devised that we are about to describe; but as the cylindrical form was not imperative (the furnace having comparatively no weight to carry within), this portion of the plant is, in the first patent, represented as rectangular, although in practice the patentees adopted the cupola form.

The gasogenes erected by Mr. Rowland at the Municipal Works, New York, are, but for a slight rounding at the ends, of the rectangular form. Messrs. Kirkham, in their patent of 1852, suggest the fixing of a tubular steam boiler over the top of the furnace, in order that the gases of combustion, by passing through it, may generate steam for all purposes of the works. They propose also a tubulated chamber, forming a part of the thoroughfare for these products, into which the air passes to receive heat, that it may enter the furnace as a hot blast. In some of the modern arrangements for making water gas this part of the contrivance is called a heat restorer.

In Messrs. Kirkham's (1852) patent the steam is to be passed *up* through the incandescent carbon, and nothing is said about a

"mixer;" but the gas is sent on to a holder for storeage until required for heating purposes, or to be carburetted, if intended for purposes of illumination.

Prior to drawing attention to the Municipal Works at New York, we must say something more about Messrs. Kirkham's inventions, in order to redeem our promise as regards dates and details. In doing so, we may remark that, although we have before us tracings from drawings, kindly lent by Mr. T. N. Kirkham, of the apparatus erected by the patentees in France so many years since, which show the system to have been, even then, in a compact and practical shape (we say practical, on the assumption that what is being done in America is commercially successful), we deem it more advisable to test the so-called improvements of later date by the original patents themselves.

In the patent of 1854 will be found the improvement, claimed with much earnestness, and a few years since patented in this country—that is, the passing of the steam downward through the hot coke for decomposing it, instead of upward; also the prototype of the mixer, superheater, regenerator, and, we might almost say, the carburetters and roasters of the present day. The patent drawings show the apparatus spread out in a line so as to make the working with *one* or *more* furnaces or gasogenes very understandable. The working drawings have, of course, a compactness and mechanical touch about their details not to be expected in the outline drawings of a patent specification; yet the latter are better for our purpose, bearing, as they do, the evidence of having anticipated all that has since been done, except in some detail arrangements, and adaptations for the use of the mineral oils.

In their specification Messrs. Kirkham state that the apparatus, as shown, is mostly in duplicate, the reason for which is to be explained; but for the purpose of simplifying the description, they prefer to deal with one furnace (the left-hand one) and its connections first.

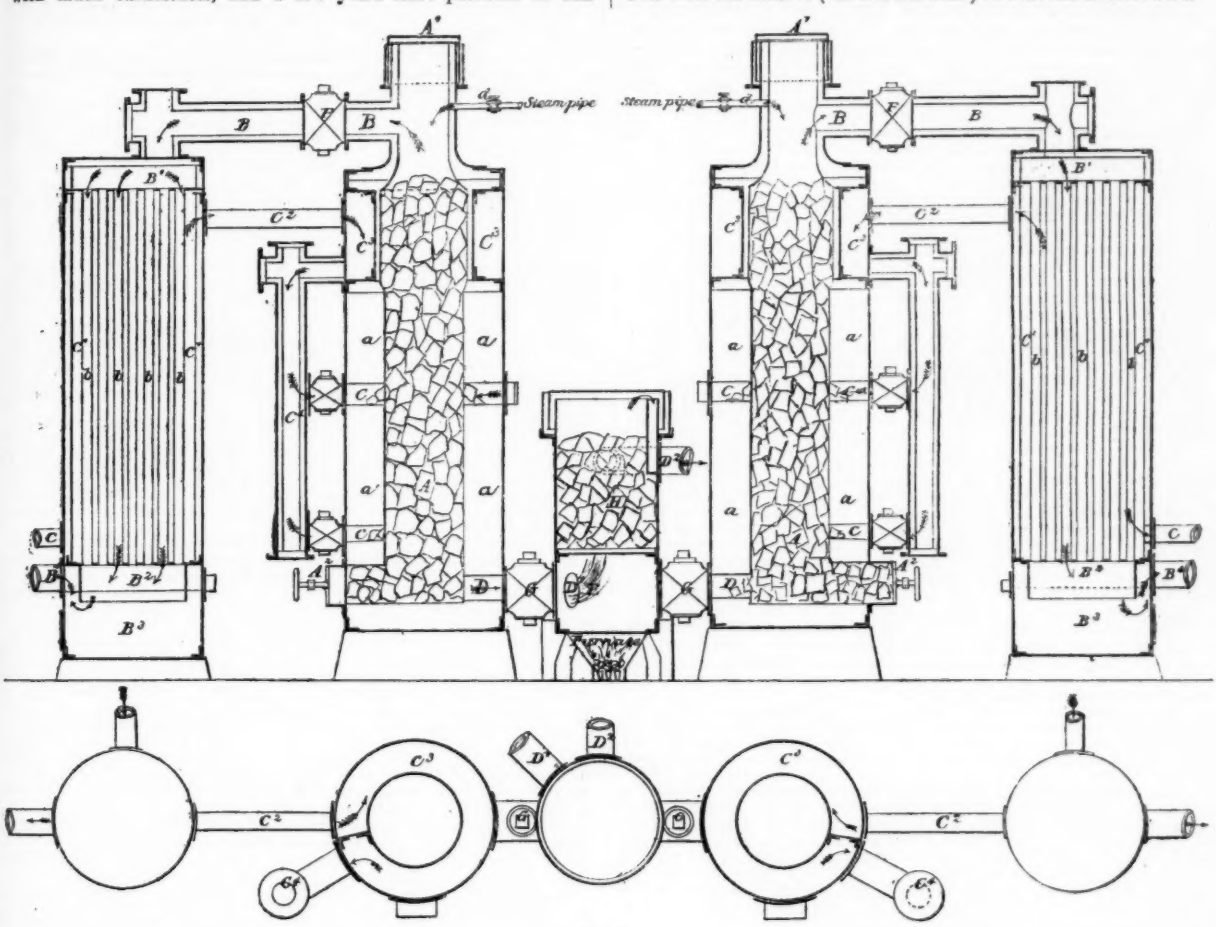


FIG. 2.

"A, fig. 2, is the furnace in which the steam or water is to be decomposed. This furnace is constructed of fire-brick cased with iron, and forming a deep cylindrical space, for the reception of coke. It is closed at top by a water-joint cover, A^1, which is removed to permit of the furnace being charged with coke. At the bottom of the furnace is an opening, A^2, to gain access to the interior for the purpose of igniting the coke, and also for clearing out the furnace when required. This opening, when the coke is well lighted, is kept closed (air-tight) by a door until the end of the operation. C C are openings made in the sides of the furnace to admit heated air thereto for keeping up the combustion of the coke.

"The air is supplied to the furnace from a vertical pipe, C^4, which is connected with an annular chamber, C^3, built into or forming part of the furnace. This chamber is fitted with a radial partition, at one side of which a branch pipe, C^2, enters the chamber, and supplies heated air thereto; while on the opposite side of the partition a branch of the pipe, C^4, leads off from the chamber, to conduct away the air after it has made the circuit of the mass of incandescent coke in the furnace, and is thereby further heated.

"The temperature of the atmospheric air supplied to the furnace is primarily raised by being conducted by a pipe, C, into a central chamber, C^1, of an air-heating apparatus, fitted with vertical flue-pipes, *b b b*, which open at top and bottom into the chambers B^1 and B^2. The upper chamber, B^1, is connected by a pipe, B, with the upper part of the furnace, A, and is intended to conduct the heated gases of combustion therefrom. A cock, F, is fitted to this pipe, for the purpose of cutting off the passage of the gases of combustion at certain periods of the process; but when this cock F is open, the hot gases pass along the pipe B into the chamber B^1, and down the metal flues, *b b*, into the chamber B^2. The hot gases will now have parted with most of their heat, and the cold air entering the chamber C^1 by the pipe C, will, by moving upwards in contact with the metal flues, *b b*, take up a considerable portion of the heat imparted to the flues by the descending gases, and thus enter the annular chamber C^3 at a high temperature.

"The gases of combustion having reached the chamber B^2, will, in order to escape therefrom, have to pass through the water in the tank B^3, and they will finally make their exit at the pipe B^4. Near the bottom of the furnace, A, opposite the firing-hole, is an opening, D, from which a short pipe, provided with a stop-cock, G, leads to a chamber, E, which we term the mixing chamber. The upper part of this chamber is provided with a grid or grating, for supporting a porous mass of broken bricks or other material, H, suitable for facilitating the mechanical admixture of the gases admitted into this chamber. For the purpose of ensuring in all cases a proper mingling of the gases, provision is made for supplying a furnace heat to the chamber E.

"The steam or water to be decomposed in the furnace, A, is supplied thereto by the pipe *d*, and the gas rich in carbon is admitted to the mixing chamber by the pipe D^1.

"The operation of this apparatus will be as follows:—The coke in the furnace, A, having been fired through the opening, A^2, air is admitted through the pipes C to different levels of the furnace to facilitate the complete ignition of the coke; the cock F is then opened, and the cock G is closed; the steam is likewise shut off from the steam-pipe *d*.

"The products of combustion rise in the furnace, and pass off by the pipe B B to the chamber B^1, thence down the pipes *b b b*, as shown by the arrows, and finally escape into the atmosphere at the pipe B^4, as above mentioned. The atmospheric air which enters the pipe C, for the purpose of supplying the furnace, we prefer to force in by a blower, and this blast of air which, as before explained, becomes highly heated before entering the furnace, we keep up until the mass of ignited coke has attained the required heat—viz., to that of fused iron, or thereabouts. When the furnace has reached about that heat, the cock F is then shut, the supply of air is cut off, and the egress of the products of combustion by the pipe B is then stopped. Steam or water is now injected on to the red hot coke through the pipe *d*, and the cock G is turned on to open a communication between the furnace and the mixing chamber, E. The steam on entering the upper part of the furnace will pass down through the mass of red hot coke, and, on arriving at the point of greatest heat, it will become decomposed into its elements. The hydrogen thus liberated will pass off by the open cock G into the chamber E. This chamber is supplied by the pipe D^1 with a gas rich in carbon, obtained by the ordinary process of gas-making. The two gases will then pass upwards into and through the mass of porous material, H, and being by that means divided into minute streams, they will become thoroughly mixed together. The carburetted hydrogen thus produced is then led off by the pipe D^2 to the purifiers, where it may be purified in the usual way, and rendered fit for burning. When the coke has parted with a great portion of its heat, and it is no longer able to decompose the steam, the supply of steam is cut off, and the cock G is shut. The cock F is then opened, and atmo-

spheric air is again thrown into the furnace to raise it to its former high temperature. As soon as this is attained, the decomposition of the steam and the transfer of the gas to the mixing chamber is repeated. It will now be seen that the action of the apparatus must necessarily be intermittent; we, therefore, avail ourselves of the use of a pair of furnaces, A (or two or more pairs, according to the amount of gas required to be produced in a given time), and these two furnaces (which are similarly provided with an air-heating apparatus) we connect to the same mixing chamber, and work them so that they shall alternately supply gas thereto to be mixed with a gas rich in carbon, as above explained. Thus, while one furnace is decomposing steam and generating gas, the other will be getting up its heat, and *vice versâ*, by which means a continuous supply of gas will be given off from the apparatus."

In the early part of this article we quoted from a report made by M. Pelouze, in 1854, to the Municipal Council of Paris, in reference to Messrs. Kirkham's patent, in which the use of water gas manufactured according to their method was strongly condemned, on account of the presence in it of large quantities of carbonic oxide—a report which doubtless contributed largely to the determination to forbid the manufacture in France. The statements contained in that report were, however, challenged at the time, and it will not be without interest if we now give the translation of a reply made to M. Pelouze by M. Jules Barse, a French chemist. The document is rather lengthy, but it will repay perusal:—

"REPLY *to M. Pelouze's Report to the Gas Committee of the Municipal Council of Paris on the Kirkham and Shephard Process.*

"M. Pelouze draws his arguments against the Kirkham process from a perusal of the text of Mr. Kirkham's specification, from hearsay, from interested attacks upon his process by industries whose monopolies are threatened by it, and from scientific documents. M. Pelouze has never seen the Kirkham apparatus in operation, and never analyzed the Kirkham gas. He reasons upon the new-comer to the advantage of coal gas, just as, 30 years ago, the partisans of lighting by oil reasoned upon the then newly-arrived coal gas. At that time MM. Pelouze, father and son, defended the cause of industrial progress represented by Wilson, and before him by Lebon; and, thanks to them, progress has ended by being in the right.

"The proscription so formally pronounced upon the Kirkham gas is, therefore, based neither upon experience of the thing proscribed, nor upon disinterested documents to support its absolutism.

"If it is well to publish the opinion of M. Pelouze upon the Kirkham gas, it is equally so to publish also what this opinion is founded upon. It is not founded upon experiment; let us see whether it is upon scientific documents.

"'Oxide of carbon, mixed with the atmosphere in the proportion of 1 per cent., kills by poisoning in two minutes. Now, the Kirkham gas contains as much as 30 per cent. of oxide of carbon.'

"Let us state more exactly, if possible, than M. Pelouze has done, the deadly proportion of oxide of carbon:—A man breathes per minute 30 litres (one cubic foot) of air, or 60 litres in two minutes. If, therefore, in these 60 litres there are 60 centilitres (36·6 cubic inches) of oxide of carbon, the man will die in two minutes. Let us make the apartment of 10 cubic mètres (350 cubic feet) capacity, and an atmosphere thus confined will be deadly as soon as 100 litres (3·5 cubic feet) of oxide of carbon are mixed with it.

"The Kirkham gas, says M. Pelouze, contains as much as 30 per cent. of oxide of carbon, or very nearly one-third of its volume. Admitting, for a moment, the truth of this assertion, 333 litres (about 12 cubic feet) of the Kirkham gas would be required to make in two minutes an atmosphere of 10 cubic mètres deadly poisonous.

"Coal gas contains about 13 per cent. of oxide of carbon. This estimate is rather more exact than that of M. Pelouze with respect to the Kirkham gas, and is based upon an experience of 30 years both in France and elsewhere. But it is not spoken about, simply for this reason:—If, in an apartment of 10 cubic mètres capacity, 100 litres of oxide of carbon kill in two minutes, 770 litres (27 cubic feet) of coal gas would make this atmosphere deadly. If, in consequence of a tap having been left open, or some leakage existing, either the Kirkham or coal gas inadvertently escapes, each will pass with the same speed through a similar orifice, since they are both of the same density, and subject to the same pressure. If the 333 litres of Kirkham gas take 333 seconds to pass into the apartment, the 770 litres of coal gas will take 770 seconds; and, with the exception of the difference in time, the air of the apartment will be equally poisonous—no more, no less—with coal gas as with Kirkham gas.

"If, therefore, we are to condemn a gas that introduces 1 per cent. of oxide of carbon into an apartment, we must condemn coal gas as well as every other; for, when a tap has been left open, or when there is any other cause of escape, it is not until after the mischief has been done that its cause is ascertained, and this applies equally to coal as to other gases.

"M. Pelouze, as a partisan of lighting by coal gas, will, doubtless, readily allow that, since we ought not to suppress the gas he protects, although it contains 13 per cent. of oxide of carbon, we ought not to condemn any other gas unless it contains more than that quantity of the poison. If he were not of that opinion, I should say that not only does coal gas contain oxide of carbon (*poison*), but also sulphide of carbon (*poison*), cyanhydrate of ammonia (*poison*), sulphuretted hydrogen (*poison*), &c., &c. We could count as many as ten. The Kirkham gas contains nothing of the kind.

"Now, prussic acid and its combinations stupify an animal that inhales them in infinitesimal doses. Coal gas contains these poisons in less than infinitesimal doses. Whatever care may be taken to purify it from these poisonous elements, the supervision of the public health, so dangerously exposed, should not be left to the care of the workmen in charge of the purifiers.

"Under this head coal gas is attacked by the report presented by M. Pelouze to the Municipal Council. But let us estimate at their real value the phantom invoked against the Kirkham process, and the ten others that have sprung out of coal gas at the call of the former. Coal gas does not kill; the Kirkham gas does not even threaten to kill its late *confrère*, and water gas, even were it what M. Pelouze supposes, would still be very different from the gas of which M. Ebelmen has made some thousands of cubic mètres. The illustrious President of the Gas Commission, in explaining to the Academy the uses of a gas composed of 90 per cent. of oxide of carbon, did not rise to condemn it. Whatever may be said, the number of deaths from oxide of carbon are very few in comparison with the extent to which this gas is employed in metallurgic operations.

"But what is the Kirkham gas? How much oxide of carbon does it contain? The Kirkham gas is produced by the decomposition of water by carbon. The process is new, but its principle is not. It is Lavoisier who, writing in 1793, teaches us what results from the decomposition of water by incandescent carbon, when describing the memorable experiment which gave birth to all modern chemistry:—

"'In a tube there are placed some moderate sized pieces of carbon, and the tube is then placed upon a furnace. To one extremity of this tube there is attached a glass retort containing a quantity of distilled water. At the other extremity a serpentine pipe is added, for condensing the liquid products to be formed. At the end of this serpentine pipe a tube is arranged to convey the aëriform fluids or gases into an apparatus suitable for determining their quantity and quality.

"'A fire is lighted in the furnace, and so maintained as to cause the tube to become red hot; in the meantime the water in the retort is made to boil. A portion of this water, which passes through the tube, condenses in the serpentine pipe; but meanwhile a considerable quantity of gas is liberated, and this escapes into the measuring vessel. The operation finished, nothing is found in the tube but a few ashes; the carbon has totally disappeared.

"'When the gases which have been liberated are examined with care, they are found to weigh altogether 113·7 grains; their total volume is 524 cubic inches. They are of two kinds—namely, 144 cubic inches of carbonic acid, weighing 100 grains, and 380 cubic inches of an extremely light gas, weighing 13·7 grains. If we verify the weight of the water that has not been decomposed, we find that it has diminished by 85·7 grains.

"'But I have shown that in order to form 100 grains of carbonic acid, it was necessary to unite 72 grains of oxygen with 28 grains of carbon; therefore the 28 grains of carbon placed in the tube have taken from the water 72 grains of oxygen. Therefore, 85·7 grains of water are composed of 72 grains of oxygen and 13·7 grains of hydrogen. To recapitulate, 100 parts of water are composed of 85 of oxygen and 15 of hydrogen.'

"Lavoisier calls the 144 cubic inches of the gas weighing 100 grains, *carbonic acid*, and he informs us that these 100 grains contain 72 grains of oxygen and 28 grains of carbon.

"After 60 years improvements in the apparatus, Berzelius and all the other chemists make a correction in the density and composition of carbonic acid. We now say that 100 grains of carbonic acid contain—

	According to Lavoisier.	According to Berzelius.
Oxygen	72 grains.	72·35 grains.
Carbon	28 „	27·65 „
Total weight	100 grains.	100·00 grains.

Sixty years progress in perfecting the instruments have, therefore, led to the correction of half a grain in the composition of carbonic acid as found by Lavoisier, who used to produce 100 grains of carbonic acid with 87·7 grains of water.

"The principle of the Kirkham process was, therefore, found out in 1793, at which period all the water was decomposed into carbonic acid and hydrogen. That is an unquestionable fact. What does it matter if, since then, water may have been decomposed into oxide of carbon and into hydrogen? Is Lavoisier's process lost? No. Therefore we can do to-day what he did in 1793.

"This was why M. Dumas was right in directing his friend Sellique's attention to the manufacture of water gas. This is why M. Jacquelain, at the Société d'Encouragement, presided over by M. Dumas, was able to announce as one of the greatest progresses of our time the taking up again of the processes for the manufacture of gas from water, and to propose the establishment of a national prize for the authors, whom, now, M. Pelouze simply denounces to the police.

"We need not participate in M. Jacquelain's enthusiasm; but, at least, before adopting the conclusions of M. Pelouze, let us look at the Kirkham process; let us not stifle it before its birth. Preventive persecutions in scientific and industrial matters recall too gloomy recollections. The history of Lebon and Wilson, those unfortunate precursors of the success of coal gas, so eloquently introduced by M. Pelouze in his treatise on gas, imposes upon us the duty of seeing before judging, of judging before condemning.

"It is proved that water passing over incandescent coke may be decomposed into carbonic acid and hydrogen; *à fortiori*, as M. Pelouze says, it may be decomposed into gas containing 1, 2, 3, 5, or 10 per cent. of oxide of carbon. In this proportion water gas will be still less deleterious than coal gas, and as it is impossible to manufacture gas from coal without oxide of carbon, as all coal gas manufactured up to now contains from 12 to 13 per cent. of this poison, we must conclude that there can be no further improvement in coal gas, while absolute perfection may be attained by the decomposition of water.

"Let us now pass to the objections raised against the borrowed carburation. First of all, let us ask M. Pelouze what coal gas would be after the condensation of the hydrocarbonaceous vapours which it mechanically carries with it. It is notorious, I suppose, that without the 7 to 15 per cent. of these vapours mixed with this gas, it would be, as after the action of chlorine, a very poor lighting element. In this case—in winter, for example—the volume remaining after condensation would be from 85 to 90; and out of this volume there would be 12 to 13 parts of oxide of carbon, which never condenses.

"If coal gas did not contain the vapours that M. Pelouze disapproves of in water gas, I should understand the reason for his objection; but in this case the objection applies equally to coal gas.

"Be that as it may, will the Kirkham gas be a mixture of vapours and pure hydrogen, as M. Pelouze supposes? No. A quadricarbonaceous gas, similar to that obtained from coal, resin, or oil of schist, will receive the pure hydrogen in its passage from the cylinder to the gasholder. All permanent gases, whatever may be their respective densities, mix with and penetrate into each other molecule by molecule; that, at any rate, is what M. Pelouze teaches in his excellent treatises on chemistry. We even find, in his last editions—when referring to the water gas employed in M. Christolfe's workshops, for example—opinions which accord but little with those expressed in the Municipal Council. As far as we know, no one died in M. Christolfe's establishment, and everybody saw clearly; but at what cost? M. Lacarrière or some one else might be able to tell us, as the gas manufactured at that time was not produced by the Kirkham apparatus.

"To sum up, then, will the water gas prepared by the Alliance Company be innoxious? Will it be luminous? M. Pelouze does not know; he has neither seen nor analyzed it. The Alliance Company know something about it. Madrid is lighted to the extent of some 32,000 mètres (about 20 miles) by the Kirkham gas. The Alliance Company also know, and on reading the text of Kirkham's patents—patents taken from an English point of view, where the use of oxide of carbon is not forbidden—we find that the Kirkham gas may give up to 30 per cent. of oxide of carbon.

"But the Alliance Company assert that, in France, the Kirkham apparatus, managed according to the rules laid down by Lavoisier, will never give so much oxide of carbon as may be contained in even the best purified coal gas. The Company go even farther, and assert that by adhering more and more closely to Lavoisier's principle, by practice, and by following the advice they find given in the works of M. Pelouze, they will arrive at producing a gas totally free from oxide of carbon.

"If Coal Gas Companies show themselves eager to come to conclusions before making any experiments whatsoever, we must presume that they consider themselves in the presence of very formidable adversaries. Are the anxieties of the Gas Companies to be shared, or, rather, embraced by the Municipal Administration? Such is, after all, the real question.

"*Paris, July 5*, 1854." "JULES BARSE, Chemist.

(To be continued.)

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

THE TEMPERATURE OF GAS IN ASCENSION-PIPES.

SIR,—I am amused at the cool way in which Mr. Collinge ignores my letter in the JOURNAL of the 28th ult., detailing the experiments I made on this subject, and the conclusions, mainly in anticipation of his own, at which I arrived.

There can be little doubt, as my experiments prove, that the high temperatures which Mr. R. O. Paterson found in the ascension-pipe were not those of the gas at all, but were chiefly due to the volatile tarry matter in suspension therein.

The remark contained in your foot-note to Mr. Collinge's letter is just, and it is desirable that the faculty of "accurate observation" should be extended to reading as well as experimenting.

5, Norfolk Street, Manchester, June 5, 1878. THOS. NEWBIGGING.

COMMISSIONS.

SIR,—In *The Times* of the 6th inst., there was a leading article on the above subject, which may have escaped the notice of many of your readers.

Will you allow me to give a few extracts from it?

"The practice of receiving commissions has been pronounced illegal in every way, and this in terms which will make it impossible for any man to meddle with it with a notion that he can be acting honestly. A usage, however prevalent, which is declared to be corrupt in itself and opposed to common morality, must be held to go far beyond the doubtful border line at which impropriety begins. . . . It is obvious, too, that to one side or the other a commission must be unjust. If the receiver of it does the work he is paid for, it is his principal who will suffer. If he takes it and does nothing for it, it is hard to see what sort of defence he can make for putting it, thus unearned, into his pocket. . . . His judgment, if he cares to think about the matter at all, will be influenced in the way intended, and he will give advice which is not the best, or will accept terms which are less favourable than they might have been. . . . From this time forward the law, at all events, will be certain. Until the case of *Harrington v. The Victoria Graving Dock Company* has been reversed on appeal—and we scarcely think it likely it will be carried into the Appeal Court—the rule will hold good, that a commission is in its very essence an illegal and a fraudulent thing. There is, indeed, no point of view left from which the law has not declared against it. . . . The weak point in the matter is that it is so very seldom that the offence can be brought to light. Only two parties need know of it, and it is to the interest of both of them to keep it secret. But it is of no slight importance, even so, that the law of the case should be clearly settled. Many a man will do an act which he knows to be not quite honourable, and will yet shrink from what the common voice of mankind has pronounced to be downright dishonesty. There is no room left now for subterfuge in the matter of commissions. They are dishonourable and they are dishonest too, and those who give them and those who take them must expect to be judged accordingly."

I hope the forthcoming meeting of the British Association of Gas Managers will not be allowed to pass without such an expression of disapproval of the system as will tend to its abolition amongst Gas Officials. INQUIRER.

THE CHANNEL PASSAGE TO THE PARIS EXHIBITION.

SIR,—As a large number of my gas brethren, Members of the British Association of Gas Managers, will, on the 21st inst., be crossing the Channel on their official visit to the Paris Gas-Works and the "Gas Lighting Section" at the Paris Exhibition, will you, through "our JOURNAL," allow me to give them a hint to avoid sea-sickness, culled from a late number of the *Daisy?* A gentleman, who has often to cross the Channel, writes "that he made his respiration coincide punctually with the heave and fall of the vessel. As she rose he *inspired slowly* and *regularly*, and as she fell he *expired* correspondingly, the effect being so completely successful as, at several times, to produce sleep; but each of these times, presumably because the breathing was not then synchronous with the vessel's movements, he was awakened by sensations of sickness, which two inspirations and expirations, as above explained, immediately dispelled, enabling him to complete a very rough passage with comparative comfort."

There can be no doubt that sea-sickness arises, in a great measure, from the oscillation of the diaphragm of the stomach, and I can perfectly understand that, if the breathing is made to correspond with the pitch of the vessel, there will be less *cause* for sickness. The remedy proposed is, therefore, well worth a trial; and, as I shall myself put it to the test on the occasion named above, I trust I shall prove it to be successful, as I am not a good sailor.

Sydenham, S.E., June 8, 1878. MAGNUS OHREN.

THE REMOVAL OF SULPHUR COMPOUNDS.

SIR,—Some few weeks since I stated the fact of my being in the habit of distilling ammonia into the hydraulic main of our works. Will you kindly allow me now to state that I do not find it necessary to coat the ascension-pipes with non-conducting material, to raise the temperature of the gas in the hydraulic main; but I combine steam with the distilled ammonia, and send it into the hydraulic mains at the extreme ends; and, as this heated ammonia and steam have to pass each dip-pipe, from which the crude gas is escaping, they mix freely together, and flow on to the outlet, and enter the horizontal condensing main with the tar and liquor. In this way I can readily raise the temperature of the gases in their crude state. I have, of course, provided suitable apparatus to regulate the temperature of the steam, &c., entering the hydraulic main.

As it would not be desirable to convert the tar into pitch at that point, at a spot in the horizontal condensing main where the temperature is about 120° Fahr., I drop the tar and liquor through a dip-pipe into a strong wrought-iron air-tight tank, having a vent into an air-tight tar-well. In this tank the tar settles away from the liquor, and can be readily drawn off into barrels, &c., for the market. The clear liquor is very strong in ammonia; and, as it contains very little carbonic acid, I have provided special means to regulate its temperature, and to pump it direct into what I term a scrubber-washer—an apparatus specially designed to break up the cold gas into the thinnest possible streams, and bring it into close contact with the strong ammonia which I cause to pass through it.

I do not wash my gas with liquid ammonia on the outlet of the hydraulic main, as was shown the other day in the description you gave of an apparatus in the JOURNAL, because I found, when I made experiments some time since, that a large quantity of thin oily tar was deposited, and the general effect on the gas was not so good as we desired, besides making an extra pull of 3 inches for the exhauster, and an unsteady gauge on the hydraulic.

I then constructed a kind of brush arrangement, composed of a great number of small wires suspended with their points in water. As the water-line could be regulated in this vessel at pleasure, I could easily increase or decrease the speed of the gases and vapours through the wires or spaces. This worked very well for two seasons, and gave excellent results in breaking up the gas and assisting to deposit condensable matters from the gas. Since then I have made what I consider a better and more powerful arrangement, and it is giving us good results without any additional strain to the exhauster.

I will not trespass further on your valuable space; but, at some future convenient time, with your kind permission, shall be prepared to give some few practical hints, not only upon the purification of gas by ammonia, but also upon the successful recovery of sulphur and ammonia, and the conversion of the same into sulphate of ammonia.

Lewes, June 1, 1878. JOHN HAMMOND.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, JUNE 3.

The Examiners reported that no further Standing Orders are applicable to the Cheltenham Corporation Water Bill.

Clitheroe Gas, Water, and Improvement Bill.—Commons amendments considered, and agreed to.

Bangor Local Board Bill,—read the third time, and passed.

Gas and Water Orders Confirmation Bill,—read a second time, and committed.

Petitions were presented against the Public Health Act (1875) Amendment Bill, from the Liverpool Land and House Owners Association; and against alteration in the Cheltenham Corporation Water Bill, from the Cheltenham Water-Works Company.

TUESDAY, JUNE 4.

The Examiners reported that no further Standing Orders are applicable to the Bournemouth Gas and Water Bill, and the Grand Junction Water Bill.

Newbury Borough Extension Bill,—reported.

Drumcondra, Clonliffe, and Glasnevin Township Bill,—brought from the Commons, read the first time, and referred to the Examiners.

Local Government Provisional Orders (Droitwich, &c.) Bill,—read a second time, and committed.

Gas and Water Orders Confirmation Bill,—considered in Committee of the whole House, and reported without amendment.

A petition against the Cheltenham Corporation Water Bill was presented from the Ecclesiastical Commissioners of England.

PUBLIC HEALTH ACT (1875) AMENDMENT BILL.

On the motion for going into Committee on this Bill,

Earl DE LA WARR said he thought that the measure might lead to unreasonable expense in some instances. Careful inquiry into the details of its provisions was desirable, and he therefore moved that it be referred to a Select Committee.

Earl COWPER said he thought that before their lordships entrusted the Rural Sanitary Authorities with increased powers, they ought to inquire into the way the work already entrusted to them was discharged by those bodies. He thought it was done in a very unsatisfactory manner. In many cases the members quarrelled among themselves and did nothing else; in other instances they were completely in the hands of their medical man; and in others everything was carried against the single representative of a parish, by the persons who represented the other parishes.

Lord NORTON objected to arresting the progress of the Bill, which was brought forward a second time by private Members of the other House fully competent to deal with the subject, while the Government had not found time or opportunity to deal with the subject more perfectly; but he regretted the recommencement of patchwork sanitary legislation so soon after its consolidation. The Sanitary Commission, of which he was Chairman from 1869 to 1871, to which many eminent men had devoted much attention, and whose report had been the basis of all subsequent sanitary legislation, considered the chief cause of the imperfect working of the law was the complication of the law itself and the multiplication of Acts in detail. He had, immediately upon the report, attempted a consolidating Bill, and meanwhile had a digest made of all the numerous Acts. The late Government the next year passed an Act preparing the way for consolidation, and the present Government passed the Public Health Act of 1875, of which this Bill dealt partially with one part only—namely, water supply. The Act of 1875 did not pretend to be complete in many parts, and especially in this of water supply. The Sanitary Commission said that water supply was the most difficult part of their inquiry, because it dealt not only with the interests of local authorities and consumers, but with intricate proprietary rights, and places could not well be compulsorily supplied without consideration of the whole watershed, which introduced further questions of area and rating. This Bill dealt only with rural districts and with them imperfectly, as the report of the Select Committee, to whom the Bill was referred, amply showed. Its clauses ran parallel with sections unrepealed of the Act of 1875, and the charging water rates and rents might be under either or both. Still, the Bill should pass as a step in the right direction, and as compelling the Government to complete the subject next session, and to make one complete Act on water supply, repealing the sections on the subject in the Act of 1875. To rescue water from pollution was inseparable also from its supply.

Earl KIMBERLEY said he hoped their lordships would not consent to refer the Bill to a Select Committee. Though the change proposed by it was important, it was but a small advance on the existing law. The consolidating Act of 1875 enabled the Rural Authorities to construct works for the purpose of supplying water, and to tax the whole parish for those works. It was quite clear that in some cases that might be an oppressive mode of proceeding. The Bill before their lordships would give the Rural Authorities power to charge the owners of particular cottages with a water supply for those cottages. No such charge as that supposed by the noble Earl who moved the amendment could be thrown on an owner. Clause 2 enacted that the supply must be provided at a reasonable cost, not exceeding a capital sum, the interest on which, at the rate of 5 per cent., would amount to 2d. per week. It was true that in the clause as it stood there

were added the words, "or at such other cost as the Local Government Board may, on the application of the Local Authority, determine, under all the circumstances of the case, to be reasonable;" but he intended to propose an amendment which would limit the power of increase by the Local Government Board to a sum which would make the entire cost not exceed an interest of 3d. per week. There were some persons who had crotchets against improvements, but as there was nothing more important than a pure supply of water, he hoped their lordships would not delay this measure by sending it to a Select Committee.

The Marquis of SALISBURY presumed that his noble friend meant to convey that those who opposed this Bill were the people who had crotchets against improvements. He did not oppose the Bill, but he ventured to repeat what he said on the second reading, that caution was necessary in order that the rent of cottages might not be raised, as this would be a very serious calamity to the labouring classes. Owing to strikes and the rise of prices, the cost of cottage building had considerably increased. It might be argued that it was desirable to have cottages with the best possible water supply. They might argue in that way and be victorious in the argument; but if they added to the cost and difficulty of building cottages, and if, as a consequence, those who now built them abstained from doing so, they would have won a damaging and dangerous victory in a sanitary point of view, for the overcrowding of cottages would be the result. They ought to take care that this Bill did not increase the difficulty already experienced by the labouring classes in obtaining cottages, because that would be a very serious calamity.

The amendment was then negatived without a division, and the House went into Committee on the Bill.

Clause 1 was agreed to.

On clause 2,

Earl FORTESCUE moved an amendment, making it compulsory upon every Rural Sanitary Authority to see that every occupied house in their district had, "within reasonably accessible distance, a supply of wholesome water for their drinking and cooking," thus drawing a distinction in the Bill between water for cooking and drinking, and water used for other domestic purposes. He said there was a much greater consumption of water for the latter than for the former purposes, and, therefore, on grounds of economy it was desirable to make a distinction between pot water and slop water.

The Duke of RICHMOND and GORDON hoped that the noble Earl (Lord Kimberley) who had charge of the Bill would not accede to the amendment. The Medical Officer of the Board of Health reported that in 1873 there were 240 cases of fever caused by washing, in unwholesome water, vessels in which food was afterwards cooked.

Earl KIMBERLEY could not accept the amendment.

The Marquis of BATH said that it would be a harsh thing to make the owner of a worthless cottage incur the expense of a water supply, even though he might wish to throw the cottage down.

The amendment was negatived without a division.

Earl KIMBERLEY proposed an amendment to limit the power of the Local Government Board, in respect of charge for water supply, to raising the outlay to more than a sum which would be covered by 3d. per week for interest at 5 per cent.

The amendment was agreed to, and the clause, as amended, was agreed to, as was also clause 3.

On clause 4, giving an owner a right of appeal against a requirement to provide a water supply,

The Marquis of BATH said the right of appeal was given by the clause under these five different conditions:—(1) If the supply of water was not required under the circumstances of the case; (2) if the time limited by the notice for providing the supply was insufficient; (3) if it was impracticable to provide the supply at a reasonable cost; (4) if the local authority itself ought to provide a supply of water for the district; and (5) if the whole or part of the expense of providing the supply ought to be a charge on the district. The appeal with regard to the first three conditions lay to the Justices in Petty Sessions; and with regard to the last two conditions, it lay to the Local Government Board. He contended that the appeal ought to be in all cases to the Local Government Board. The working of the Bill would virtually lie with the Inspectors acting under the Local Authority, persons who in many instances were not fit to be entrusted with such functions, being without either education or experience. If an appeal were made under either of the three first conditions above named, the Justices in Petty Sessions would hear the evidence of the Inspector and that adduced on behalf of the owner, which might be very conflicting; but they would have no technical knowledge or any means of arriving at a sound or impartial judgment on the merits of the case. Speaking as a landlord, he would himself much prefer that the question should be decided by the practical knowledge of an Engineer or Surveyor sent down by the Local Government Board. In a small village not far from his own neighbourhood, the Local Authority, by the advice of their Inspector, established a system of drainage which, instead of improving the sanitary condition of the village, made it a great deal worse than it was before. An application was made, by persons interested in the matter, to the Local Government Board, who sent down their Engineer, and that officer reported that the whole of the works which had been executed by the Sanitary Authority, and for which the proprietors of houses had been charged, were utterly valueless. To guard against the recurrence of such cases he would, therefore, suggest that the clause be so altered as to let the appeal lie to the Local Government Board, and not to the Justices in Petty Sessions.

Earl KIMBERLEY said a reference to the Public Health Act would show that the argument went in the contrary direction to that which the Marquis of Bath had indicated. It so happened that in that Act—under which this appeal was to be instituted—it was provided that the works should not be commenced without the sanction of the Local Government Board, and that the Board might appoint an Inspector to make an inquiry on the spot. He confessed he had rather a liking for Local Authorities, and had not that distrust of Justices in Petty Sessions which the noble Marquis seemed to entertain. He hoped their lordships would not alter the clause.

The clause was then agreed to, as was also clause 5, as amended.

The other clauses were agreed to, and the Bill was ordered to be reported to the House.

THURSDAY, JUNE 6.

Bradford Water and Improvement Bill.—A report was read from the Select Committee, that the Committee had not proceeded with the consideration of the Bill, having found that the petitioners had no *locus standi* before them. The Bill was therefore committed as unopposed, and reported specially with amendments.

Stoke-upon-Trent Corporation Gas Bill,—reported with an amendment.

Cheltenham Corporation Water Bill, East Retford Borough Bill, Radcliffe and Pilkington Gas Bill,—read a second time, and committed.

Local Government Provisional Orders (Droitwich, &c.) Bill,—considered in Committee of the whole House, and reported without amendment.

Gas and Water Orders Confirmation Bill,—read the third time, and passed.

The Accounts of the Metropolitan Gas Companies for the Year 1877 were presented.

Petitions against the Durham Water Bill (pursuant to leave given on Friday, May 31) were presented from (1) Corporation of Durham, (2) Rev. William Greenwell and George Gradon.

FRIDAY, JUNE 7.

The Examiners reported that no further Standing Orders are applicable to the Drumcondra, Clonliffe, and Glasnevin Township Bill.

Bournemouth Gas and Water Bill, Grand Junction Water Bill,—read a second time, and committed.

Local Government Provisional Orders (Droitwich, &c.) Bill,—read the third time, and passed.

HOUSE OF COMMONS.

MONDAY, JUNE 3.

Drumcondra, Clonliffe, and Glasnevin Township Bill,—read the third time, and passed.

Exeter Corporation Water Bill (Lords), South Staffordshire Water Bill (Lords),—read a second time, and committed.

The *locus standi* of the Corporation of Warrington, as petitioners against the Warrington Water Bill, has been disallowed, except as against clauses 6, 12, 20, 21, and 23, and so much of the preamble as relates thereto.

TUESDAY, JUNE 4.

Nottingham Improvement (Gas, &c.) Bill, Southport Water Bill.—Lords amendments agreed to.

NEWRY GAS BILL (LORDS).

Mr. RAIKES reported from the Committee on this Bill, that a certificate, under the seal of the Local Government Board of Ireland, had been produced before the Committee (under Standing Order No. 173) setting forth that the application for the powers sought to be obtained by the Bill was made without the sanction or approval of that Board. It appeared, however, to the Committee, that the object of the Bill, being to transfer to the Town Commissioners of Newry the undertaking of the Newry Gas Consumers Company, could not be obtained by a Provisional Order, but by an Act of Parliament. The Committee, therefore, considered it for the public advantage that the Bill should pass. They had examined the allegations of the Bill, and found the same to be true, and had gone through the Bill, and made amendments thereunto.

FRIDAY, JUNE 7.

Leicester Corporation Bill (Lords),—reported with amendments.

HOUSE OF COMMONS COMMITTEE.

FRIDAY, MARCH 22.

(*Before Mr.* J. HOLMS, *Chairman; Mr.* W. G. CARTWRIGHT, *Mr.* BARNE, *and Mr.* BOWEN; *Mr.* BONHAM-CARTER, *Referee.*)

NOTTINGHAM WATER BILL.

NOTTINGHAM IMPROVEMENT, GAS, AND WATER BILL.

(*Concluded from p.* 877.)

Alderman *Thackeray* recalled, and further cross-examined by Mr. MICHAEL.

I have paid a great deal of attention to this matter, and in 1874 I gave evidence on the Bill of the Company before the Select Committee. I concur in the statement made yesterday as to the terms for the purchase of the Company's undertaking. I have made no calculation to ascertain how much a consumer, who now pays £5 to the Company for his water supply, would have to pay the Corporation if they purchased the works. I believe the result of the transfer of the undertaking to the Corporation would be the provision of a cheaper supply of water, partly because of the lower rate at which the Corporation could raise capital. There would be an increased profit on the working of nearly 1 per cent. I believe the surplus profit will be upwards of £21,000.

Mr. MICHAEL: I assume, then, the Company make more profit than will pay their dividend, and this would have the effect of lowering the price. Do not you know that the general law of the land provides that as soon as a Water Company have paid maximum dividends, if there is a further sum, it must be devoted to reducing the price of water?

Witness: Yes, that is so.

Then will you tell the Committee how the consumer is to be advantaged?—Of course, if the Company at the present moment have this surplus, which I am told is the case, they would have to reduce the charge for water; but it is not at the present moment only I am looking. I admit that at the present, and at the large price we propose to pay the Shareholders, we should absorb all, and perhaps more than the present surplus applicable to dividend; but we should get rid of these parliamentary contests. We should save the costs of these, and in further capital that might be raised, as I have said, we should save.

Re-examined by Mr. VENABLES: The effect of the Company raising new capital at the present rate would be to enable them to divide those receipts which they cannot now divide. I believe that there will be a saving in raising the money if the Corporation get the works, and that, on the whole, the bargain will be advantageous to the Corporation and to Nottingham, and at the same time to the Shareholders?

The CHAIRMAN: The Corporation already have the gas under their management, have they not?

Witness: Yes.

Mr. *S. G. Johnson*, examined by Mr. VENABLES.

I am the Town Clerk of Nottingham. I am aware of the circumstances connected with the purchase of the gas-works. Those works were transferred to the Corporation from the Gas Company by voluntary agreement. The maximum dividend which the Gas Company could pay was 5½ per cent. We paid them ¾ per cent. additional dividend for seven years, making it 6¼, and at the end of seven years we paid them 1 per cent. Those were less favourable terms than we now offer to the Water Company. The Gas Company at that time were paying their maximum dividend. The result of the purchase of the gas-works has been very advantageous to the town, enabling us to reduce the price of gas twice and to increase the reserve-fund. We pay perpetual annuities to the old shareholders, and we have a sinking-fund, so that we shall ultimately redeem those annuities, and in course of time the gas-works will belong to the town, free of any capital charge. The purchase was satisfactory to the town; it was voluntary, and the shareholders were satisfied with the bargain they made. With reference to the affairs of the Water Company, I think of late years the excess of their receipts beyond the amount available for dividend has been about £3000 per annum. The maximum dividend amounts to £17,500, and the amount of profit available for dividend last year was £19,797, being an excess of about £2500. We have not the subsequent account, but we have every reason to believe that this year there will be a very large increase in the sum available for distribution as dividend. We estimate that there will be £22,000, being £4000

or £5000 more than can be divided. As long as they acquire no additional capital, that surplus gives them no profit. The only thing for them to do would be to reduce the rates for water. If they raised £100,000 new capital, the advantage to them in having profits in hand would be in being enabled to pay their Shareholders 5 per cent. on the capital, and they would get £75,000 bonus. The reasons of the Corporation for desiring to obtain the water-works are these: First of all, the Town Council would do the financing instead of the Company—*i.e.*, instead of raising money at 5 per cent., and large bonuses being put into the pockets of the Shareholders, the Corporation could effect a saving by borrowing money at a little under 4 per cent. Then we should supply the outlying villages, such as Carlton, with water much quicker than the Company, for this reason: The trade of Nottingham is carried on as much in the outlying villages as in the town itself. The lace goes in and out, and in the stockings or hosiery trade the articles are carried in and out, being manufactured in the town, and taken out to such villages as Carlton to be finished. If there is any epidemic at Carlton, it is certainly seriously felt in Nottingham. For instance, there was a short time ago a small-pox epidemic at Sneinton, and that cost us £10,000, for we were obliged at last to take all the patients suffering from the small-pox, and put them in our own hospitals, in order to stamp out the disease. We have already parliamentary authority to supply these outlying districts with water, whereas the Company have no power to extend their limits. We have supplied all these places with gas, and we could do the same with water. In the next place, we should, as we are now doing in the matter of the gas, put aside the sinking-fund which Parliament would fix, with which the capital debt of the undertaking would be ultimately wiped out. Then we should also be saved, as has been mentioned by Alderman Thackeray, the cost of continual parliamentary litigation. Then we should have, instead of duality in municipal management in certain things, uniformity of management. We should have, for instance, the control of the streets, the repair of the streets, and the watering of the streets. As it is at present, the Company have a right to disturb the streets, and we have to see that they do their duty in putting the streets to rights again. We are not here to make complaints, but in practice it has been this, that we do the repairs ourselves, because it is more convenient. We water the streets, and the Company supply us with water. They supply us through meters, but if we had the control of the water we should most probably avail ourselves of the natural pressure of the water, and distribute it for the watering of the streets. As it now comes to us through meters the pressure is lost. Then there is a duality of management in respect to fires. The Council have the fire-engines and the men, but the Company have the turncocks and the hydrants. It, therefore, requires the action of two independent bodies before a proper supply of water can be had for a fire. With regard to requiring a proper water supply to tenants, we have the power of compelling a supply, but the Company have not. The Company can only supply after we have taken action in the matter. In those respects there would certainly be great convenience, and in course of time economy, arising out of the transfer of the undertaking. The main and strongest motive of the Corporation in wishing to acquire the water-works is that of economy to the community. I have ascertained the feelings of the ratepayers on the subject. They are undoubtedly anxious for a change, and every November election brings in men who are pledged to do what they can to get the control of the water supply into the hands of the Corporation. Last November all the members of the Council retired, in consequence of an extension of the limits of the borough, and the ratepayers then made it the leading question that their representatives should strive to get the supply of water into the hands of the Corporation. The 6 per cent. that the Council offered in 1873 and 1874 was freely discussed. The ratepayers thought that it was a very liberal offer, but they seemed quite willing to pay that large sum rather than have the water supply in the hands of a private enterprise. By the authority of the Corporation, I a short time ago addressed a letter to the Directors of the Water-Works Company, offering to pay them, for the purchase of the water-works, all their lands and appurtenances, 30 years purchase of the maximum parliamentary dividend of the Company, to pay up the arrears of old dividends, and to pay off their mortgages, debts, and obligations, and showing that the Council would undertake to supply the districts as was now proposed by the Company to supply, and to supply Hucknall in bulk, as required by the Local Board. On Feb. 19, 1878, I was directed by the Nottingham Corporation to offer to pay to each Shareholder of the Company in respect of a £50 share a perpetual annuity of £3 per annum, and to each Shareholder in respect to a smaller amount a perpetual annuity in proportion; secondly, to pay off the arrears on the old dividends, if there be any. That offer was made with the view of the Corporation obtaining the control of the water supply, which for public reasons should be in their hands, and also with the view of avoiding the cost of perpetual litigation, which the Town Council are anxious should not recur. This offer was considered by the Corporation to be a very liberal one, and more than the value of the undertaking, not only in its present position but the value of its future development. The same offer was made in 1874. I think it would be an advantageous investment for the Nottingham Corporation. It would at any rate meet with the approval of the public to have the supply of water in their own hands.

Cross-examined by Mr. MICHAEL: The manufacturing supply should always be made subsidiary to the domestic supply. I believe as a rule it is so in this case. We do not come here with a grievance, but we consider it a misfortune that there is a duality of management. If the works were in the hands of the Corporation, they would be worked by the same staff. I do not know that if additional duties were imposed upon that staff they would require additional remuneration. As a matter of fact, I am paid an additional salary on account of the gas-works having come under the management of the Corporation, and, as a general rule, it is quite right that it should be so. When I said that the Corporation had power to go beyond the boundary of the borough in order to supply water in the surrounding districts, I referred, not to their special Act, but to the Public Health Act of 1875, which states that we may, with the sanction of the Local Government Board, go into any adjoining district on such terms as may be agreed on between such authorities, or, in case of dispute, as may be settled by arbitration. I am not clear, with respect to the supply of water in our own district, that we have any difficulty in bringing compulsory power to bear upon the Company. We have had to close a number of wells in the borough. I was very much surprised when I heard in this room that the Scotholme water is still used by the Company. In 1869 Mr. Hawksley declared that the water from the Scotholme Springs was wholly unfit for consumption.

The CHAIRMAN: Was there any complaint about the gas-works when they were taken over?

Witness: None at all.

This concluded the case for the Corporation.

Mr. PEMBROKE STEPHENS addressed the Committee on behalf of the Hucknall Local Board, in opposition to the Bill of the Company. He said the Company had been twice officially requested to supply water to the district, and had on each occasion refused. In 1874 they were asked to sell water to Hucknall, and they refused to do so; and that although, as had been shown, their position as regarded the supply was as good as it was now. In 1877 an application for supply was again made and refused. The Board had now made an application for a Provisional Order enabling them to supply themselves, and they did not desire to be handed over to this or any other Company. In support of their Bill the promoters had put Dr. Pole forward as a witness. Dr. Pole was called to curse, and he came to bless, for the report he referred to, of the Royal Commission on Water Supply, recommended that the distribution should be in the hands of the Local Authorities rather than in the hands of Companies. The Hucknall Local Board being now free from any Company, wished to keep so; and they asked the Committee to take the evidence produced on the part of the promoters as the strongest reason why Hucknall should not be handed over to them.

At the close of the learned counsel's address, the room was cleared, in order that the Committee might consult with respect to the evidence to be offered by the Hucknall Local Board. Upon the re-admission of the parties,

The CHAIRMAN said: The Committee have decided to pass the petition of the Hucknall Local Board, but giving the Company the right of way for their pipes through the district.

Mr. MICHAEL, in replying upon the whole case on behalf of the Company, said: It appears that the Corporation do not object to the scheme in its entirety, or to any part of it—that is to say, they not only think it desirable, but necessary, in order to promote the sanitary welfare of the borough of Nottingham, that the power we seek should be vested in one authority or the other. Thus they do not object to our being the authority to supply water to this district. Before going further, I may say that I was under a like misapprehension with respect to what was stated by Mr. Johnson, the Town Clerk, in his evidence. I understood him to claim powers for the Corporation under some local Act, while he simply referred to the Public Health Act of 1875. Under this Act, if the power were given to the Town Council to supply water, they could supply it not only to the borough, but also to the districts immediately adjoining, but these districts are not places immediately adjoining. Any ratepayer might stop them. My friend, Mr. Venables, said that the Corporation were with the Company in their desire to have these districts supplied—that it would be a great benefit—and the formal evidence of the Corporation was to the effect that such a supply is essentially necessary for the sanitary government of the borough. On all hands this is admitted, and the only question is how much money is required for the purpose. You, as the Committee, must decide this. The Company, up to the present, have fulfilled their parliamentary obligations; witnesses have told you that there is no complaint whatever to be alleged against them as to the manner in which they have discharged their duties, and a more admirable supply of pure water under liberal circumstances is not afforded in the country. We stand, therefore, without reproach as a Water Company. What is asked of you, then, in the first place, is to order the transfer of this undertaking to the Corporation; and, secondly, if you do not go so far as to make what I venture to call a precedent, you should take from the interest in the undertaking what they have under the Companies Clauses Act of 1863. Such a course is entirely without precedent; and in the cases brought before you as bearing upon this point—whether in the case of Stockton and Middlesbrough, of Birmingham, or Cheltenham—there was the strong allegation that the Company had not discharged their duties to the public, and that the intervention of the strong hand of Parliament was necessary to stop the alleged misdoing of the Company. I am not going to take up your time by detailing at length the circumstances attending these cases. It will be sufficient to call your attention to the fact that in the Stockton case there was a proposition to take water from the Tees, which was not a fit source of supply, and, at the same time, it was allowed on all hands that the existing supply must be supplemented in some way. But in our case no purer water could possibly be given. In the second case, that of Birmingham, although it was not a case of compulsory sale, it was strongly urged that it was impossible for the Corporation, as a Sanitary Authority, to carry on their duty as a Sanitary Authority, and supply the thousands of houses which were not properly supplied with water; and also that the large expense of providing the great quantity of water, and promoting the compulsory powers of the Sanitary Act, would practically cause a revolution in Birmingham. In Cheltenham there was an acknowledged deficiency of water. The Company asked to bring in a supply of river water, and the Corporation also promoted a Bill. In all three cases people came before the Committee in order to induce them to put pressure upon the Water Company, so as to cause the undertaking to be transferred from the Company to the Corporation. I heard the speech of Mr. Venables in the present case, and I waited in vain for any reason to be stated why the undertaking should be transferred. The only question put before you was a financial one. If you transfer the property, the Corporation say they can supply the water at a cheaper rate. I dispute the possibility, unless you confiscate the property of the Water Company. This is a valuable right of raising capital, and you are asked to overrule it, and transfer the undertaking into other hands, in order that they may reap profit thereby. But if they acquire it compulsorily, they must pay for the worth of the undertaking. It is evident that a very important element in the undertaking is the prospective value. If there is a prospective value in the undertaking, they must pay for that as an essential part of it, and pay for it that which is its value. It is said that at the present time, owing to the natural increase in the revenue arising from this Company, they have an estimated surplus this year or next of £4500, the year afterwards adding £500; but in 12 or 18 years from this time there will be a sum sufficient from the new capital to pay the dividend. What will be the consequence? Within 18 months there must be a diminution in the price of water. But will not that deduction be rather retarded if the proposal put before you is adopted—a proposal which is so extremely liberal; and when a Corporation are liberal, it is wonderful how great their liberality is. They offer to give us a smaller sum than we could get in the market. And if, instead of the profit of 5 per cent., which is now paid, they offer 6 per cent., out of whose pocket is that 6 per cent. to come? Only from the ratepayers. They must charge for the water directly, or take it out of the general district rate; and they both come out of the same pockets. I venture to say that not one single reason, except that they wish it, and that the general feeling of the population of Nottingham is in favour of the transfer of this undertaking, can be adduced. But is it at all wonderful that where great profit has accrued, the general feeling on the part of the ratepayers should be in favour of the transfer, especially as it is not to come from their pockets? There is not a single reason. No complaint can be made as to the conduct of the Water Company. And how is the transfer proposed to be effected? By auction clauses. The argument against these is both positive and negative. When the House of Commons, and subsequently the House of Lords, had their attention specially directed to them, they drew a broad line of demarcation between gas and water works, including one and excluding the other. They did not intend auction clauses to apply to water-works. The exclusion of one matter considered shows they had no intention that auction clauses should be allowed. Up to within the last few years there were three Companies—the Chesterfield, Sunderland, and Nottingham—to which the auction clauses referred. By subsequent legislation, the auction clauses, as relating to Water Companies, have

been removed. On principle, there is a great reason why auction clauses should not apply to Water Companies, although they apply to Gas Companies. Where auction clauses apply to Gas Companies they are accompanied by another provision, that of the sliding scale. The Legislature, in effect, says to them, although we take away from you the power of raising capital, and destroy the interest of the old Shareholder in the future progress of the undertaking, although it is our wish to prevent an undue expenditure of capital, we will give you such inducements as will cause you to be economical with your capital, and so conduct your Company in the future as will place at your disposal an increased profit. There is a difference between Gas and Water Companies in the manner of increasing their profits, for whereas for every additional 1000 feet of gas there is more revenue accruing, the measure of revenue of the Water Company is not the amount of water supplied. The smaller the quantity of water supplied, providing the obligations are properly discharged, so much the better for the Company, and the sliding scale cannot, with justice, apply to water. Increased consumption of gas brings more profit, but in the matter of water an increased number of consumers cannot cause a single farthing more to attach to the revenue; therefore the sliding scale cannot apply. The object of the auction clauses in the case of Gas Companies was also to cause the whole of the capital to be raised at 5 per cent.; 5 per cent. was the ruling amount at which gas property was bought in the open market, but the gas profits were allowed to go to 7 per cent. This Company were permitted to borrow money at 5 per cent., and the object of the auction clauses was to reduce the 7 per cent. to 3 per cent., which in reality was the total amount they could derive from increased capital. Is it too much to ask that a man who has invested his money should be able, owing to the skill he has used in the development of his property, to reap the advantage accruing from any further issue of capital? What is the meaning of the premium at which shares in this Company are quoted in the market? If it is true that a £50 share fetches £78, it is in the first place owing to the fact that it is known that the Company have got a larger amount of property to back it up, and that Parliament, judging from the conduct of the Company in the past, would allow a very natural extension. If the Company had carried on their affairs so badly as only barely to pay 5 per cent., their shares would not have been at a premium in the market. I ask whether any case has been made out against them, and why the Company, having well supplied their consumers, having fulfilled the whole of their parliamentary obligations, having done nothing to call upon them the censure of Parliament—for the transfer would be nothing less than a censure upon the conduct of the Company in the past—why there should be a departure from all precedent, and the auction clauses be inserted, which would have a penalizing effect upon the Company's past action. I ask you to grant such an increase of capital as will permit the Company to undertake an extension of the limits which is admitted on all hands to be desirable, that you will allow them to go on in their course of usefulness, and not do anything to keep them from the operation of the general law of the Companies Clauses Act of 1863, and that in future the Company's capital shall be divided amongst the Shareholders. I ask you to carry out the Legislation of 1874, because this is not the first time the Corporation have attempted to prevent the extension of our works. They come here not able to make one single complaint, and, therefore, I ask you to grant the prayer of the Company, and pass the preamble of their Bill.

The room was again cleared, and, on the parties being re-admitted,

The CHAIRMAN said: The Committee find that the preamble of the Nottingham Water Bill is proved. The Committee direct that the auction clauses shall be inserted, and that the capital shall be reduced to £100,000, with the usual borrowing powers of £25,000. The Committee also find that the preamble of the Nottingham Improvement, Gas, and Water Bill is made out, the reference to the purchase of the water-works being struck out.

TUESDAY, MARCH 26.

The clauses of the Company's Bill were proceeded with.

Mr. VENABLES submitted a clause limiting the amount of stock which could be put in the market at one time. He said the Company proposed a clause, which his clients had very little objection to; but they would like to see the powers given by it somewhat restricted. That clause was to the effect that they should be entitled to put the shares up to public auction at such time and in such quantity as they thought fit. What the Corporation wanted was to get the Committee to limit the quantity which should be put up at any one time, and to restrict the sales during the year to a fixed number. The clause he now proposed would enact that stock could not be sold at any one time exceeding the value of £1000, nor at less intervals than three months. He also asked that two more clauses should be inserted in the Bill, one to the effect that the whole nominal value of the stock should be paid to the Company within three months of the date of each sale. This, he thought, would not do the Company any harm, neither would the first clause he had proposed, and they would give his clients a certain amount of security. The clause he wished to have placed in the Bill was to the effect that the Company should not pay out of their profits any larger dividend on the additional capital given by the Bill than £5 in respect of every £100.

The CHAIRMAN said it would be a much better plan for the parties to agree amongst themselves than for him to decide between them, and he would therefore give them a short time so that they might settle the matter.

After an interval,

Mr. VENABLES submited his clause in an amended form. It provided that the Company should not offer for sale any greater sums than £10,000 or at shorter intervals than two months, until March 5, 1880; and after that not at shorter intervals than three months. The object of this, he said, was to prevent the Directors flooding the market with stock.

Mr. MICHAEL said that in their petition his opponents had only asked that the clauses contained in the Act of 1854 should be introduced into the Bill, but now they wanted the Committee to place entirely new provisions in the Bill. It was the object of this, as it was of every Company, to get as large an amount of premium upon their stock as possible, and, therefore, they would take just the opposite course to that which Mr. Venables wished to guard against—viz., flooding the market. This clause was quite unnecessary, and he would beg the Committee not to insert it.

The CHAIRMAN: Was there a limitation in the Act of 1854?

Mr. MICHAEL: There was not, except such as exists in the present Bill. You will see we have exactly reproduced the clauses of the Act of 1854 in our Bill.

Mr. VENABLES said it was to the interest of the Company that this clause should be in their Bill, and, if they did not wish to increase their security, the Corporation did, and they, therefore, still asked the Committee to insert the clause.

The CHAIRMAN: Is there any objection to the clause respecting the amount of dividends?

Mr. MICHAEL: No; I have no objection to that.

The CHAIRMAN: And is there any objection to the other clauses proposed excluding that relating to limitation?

Mr. MICHAEL: No; I do not object to them either.

The CHAIRMAN said the Committee would allow those four clauses to be placed in the Bill, but would disallow the fifth, which provided that shares should not exceed £100 each.

The remaining clauses were gone through and settled, and the Chairman was ordered to report the Bills, as amended, to the House.

PUBLIC HEALTH ACT (1875) AMENDMENT BILL.

The Select Committee of the House of Commons to whom this Bill was referred have agreed upon the following report:—

1. It will be observed that the Bill proposes, in certain cases, to enforce the provisions of water supply, either (1) on the owners of the occupied houses, subject to certain limitations, or (2) on the district or contributary place, taken as a whole, within which the houses are situated.

The Committee have had several other points of great importance brought under their notice in the course of the inquiry; but not feeling justified in dealing with them in the Bill referred to them, they have agreed to the following report.

2. Suggestions have been made to the Committee by various witnesses, for the amendment of the law, with the following objects:—

1. To enable Sanitary Authorities to take water compulsorily, their power to do so having been called in question.
2. To require a Sanitary Authority to make an equitable charge for the cost of water supply on the property benefited by the supply, instead of charging it on the rates.
3. To regulate the relation of the Water Company or Water Authority with the Local Authority.
4. To make further provision for rural districts from which the Water Companies or Water Authority take the water, or through which the mains pass.

I.—*Compulsory Powers.*

3. The Committee have been impressed with the importance of amending a defect which has been found to exist with regard to the taking of water otherwise than by agreement. From the date of the passing of the Public Health Act up to last session of Parliament it was believed that Provisional Orders could be obtained under the Act, by which water rights could be compulsorily taken.

Several Provisional Orders have been obtained under the belief that the compulsory taking of water rights by Provisional Order was legal under the meaning assigned to the word "lands," the word "lands" being defined to include "messuages, buildings, lands, easements, and hereditaments of any tenure;" and it was thought that, under the definition, a Local Authority could purchase water rights compulsorily under the 176th section of the Act of 1875. During the last session of Parliament a Committee of the House of Lords—when considering a Provisional Order, for the compulsory purchase of water rights under that section, by the Local Board of the West Houghton district—decided that the Order was *ultra vires*, and, consequently, it was not confirmed.

The Law Officers of the Crown were then consulted, and they advised:—"We are of opinion that, in issuing a Provisional Order under the 176th section of the Public Health Act, 1875, the Local Government Board cannot confer upon a Local Authority power to purchase for the purposes of the Act, and otherwise than by agreement, any right to abstract water from any stream."

It follows from this that a Provisional Order which proposes to take water rights otherwise than by agreement cannot be made under the Public Health Act.

4. The Committee are of opinion that this decision will produce serious inconvenience to Sanitary Authorities, for it is apparent that before water from a stream can be taken by a Sanitary Authority for the water supply of its district, an agreement would have to be made with every owner, lessee, and occupier below the proposed intake, who may be affected by the abstraction of the water. The statement of the case is sufficient to show how difficult it would be to obtain the consent of those having these water rights.

A Sanitary Authority could still obtain compulsory powers by a private Bill, but it has been pointed out that the cost of obtaining a private Bill is much higher than that of obtaining a Provisional Order.

5. The Committee, therefore, recommend that, with the view of affording to Local Authorities facilities for acquiring the right to take water from any stream, the Local Government Board should be empowered to issue Provisional Orders which, on confirmation by Parliament, would confer powers on the Local Authority for the purpose.

The Committee are of opinion that the Provisional Order should incorporate the Water-Works Clauses Act, 1847, in the same manner as is usual in a private Bill, but prior to the Provisional Order, the notices, which, in the case of a private Bill, would be necessary under the Standing Orders of Parliament, should in all cases be published and served by the Local Authority.

The Committee have had a clause laid before them, which will be found in the Appendix, in the paper handed in by Mr. H. Owen, and which they recommend to the attention of Parliament.

[The clause referred to, which is of some length, provides for the incorporation of the Water-Works Clauses Act, 1847, in this Bill, with respect to the construction of works, and also a provision for empowering Local Authorities, notwithstanding the Public Health Act, 1875, to "take, divert, collect, impound, and appropriate such of the waters of any stream, whether within or without their district, as they may require for the purposes of water supply," for the purpose of any water-works which may have been constructed, or which may be proposed to be constructed by them. Before, however, doing so, they would be required to give certain notices in the local newspapers, and to the owners, and lessees, and occupiers of mills, factories, and other works using the waters of the stream for a distance of 20 miles below the proposed intake. They would then petition the Local Government Board, by whom a local inquiry, if thought fit, would be made, and who, thereupon, would issue a Provisional Order giving the power of appropriation to the Local Authority.]

II.—*Equitable Incidence of Water Charges.*

6. The Committee have had pointed out very forcibly to them that the prevailing practice with regard to defraying the costs of a water supply, does not appear to meet the equity of the case. At present a Sanitary Authority may recover the cost of the water supply in either of the following ways:—

1. They may charge the whole cost upon the rates, in which case it is paid out of the rate for special expenses; or
2. They may defray the cost by water-rates and water rents upon the consumers of the water. These charges may be insufficient, sufficient, or more than sufficient, to meet the costs of water-works. If they are insufficient, the rates have to make up the deficiency. If they are more than sufficient, the rates will be lightened by the surplus revenue derived from the water-works.

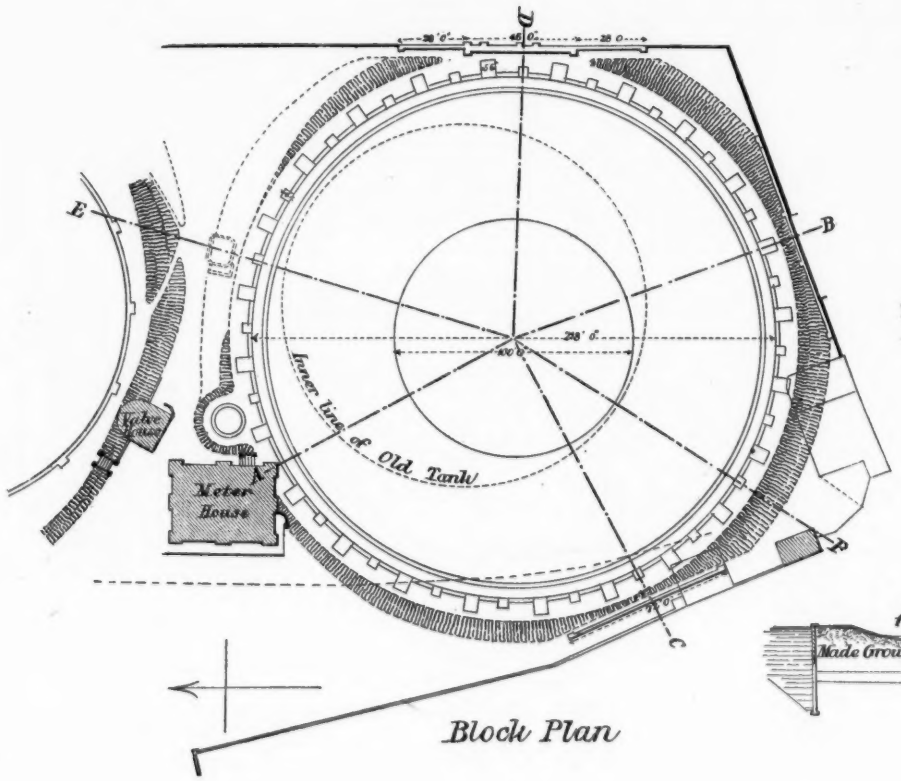
7. It appears to the Committee that grave evils result from this state of things. It frequently happens, notably in rural districts, that the whole charge is borne by the parish, under the rate for special expenses, while the supply of water is limited to the village, or a particular part for the parish.

Those, therefore, who live outside the village, or the part of the parish

PHŒNIX GAS COMPANY—KENNINGTON LANE STATION.

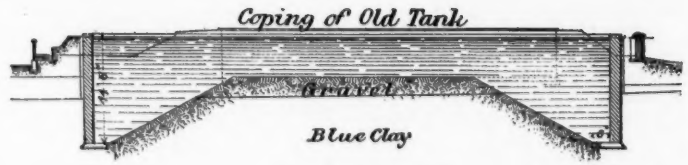
No. 1.

GASHOLDER TANK, 218 FEET DIAMETER, 44 FEET DEEP.



Block Plan

Section thro. A.B

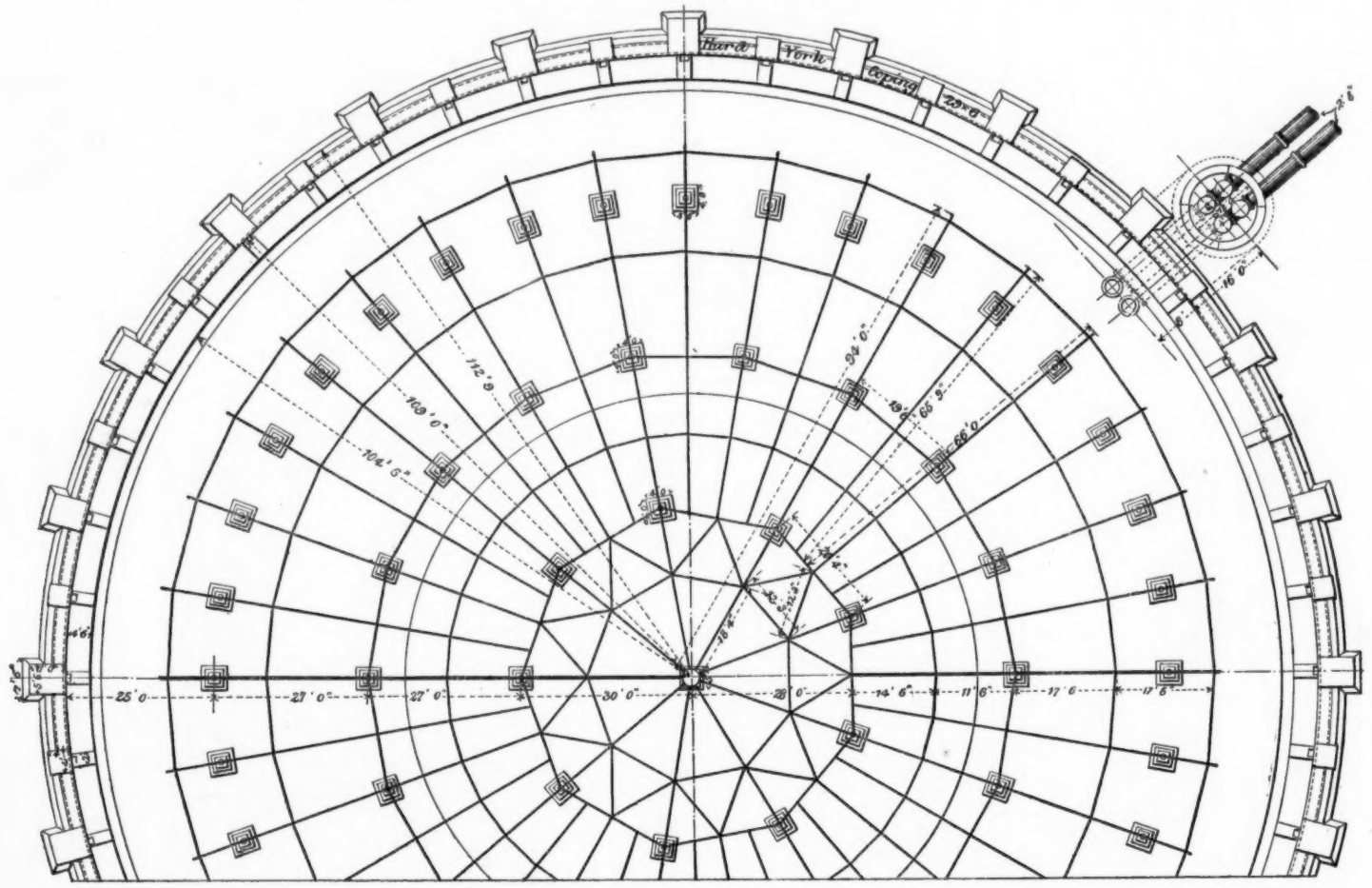


Section thro. C.D

Section thro. E.F.

PHŒNIX GAS COMPANY—KENNINGTON LANE STATION. *No.* **2.**

GASHOLDER TANK, 218 FEET DIAMETER, 44 FEET DEEP.



benefited by the supply, have to pay for the water, from which they may derive no advantage. This fact causes great opposition to schemes for water supply, and in many cases renders it impossible to carry them out.

Special districts for drainage and water supply have been in some cases formed; but objections are often raised to the formation of new rating areas, and in some cases special difficulties arise. For instance, when in a village some of the houses have water, and some have not, and when these two classes of houses are intermingled.

8. On the other hand, there are cases where the Sanitary Authority charge water-rates and water-rents, but the revenue from them is insufficient to defray the cost. Here it is obvious that the cost of the water to the consumer is lightened at the cost of the rates. To illustrate this, suppose a case of a manufacture being established in which large quantities of water were used, it would be the interest of the manufacturer to have the water cheap, and the deficit of the water account thrown on the rates.

In this case, again, those who do not benefit by the supply pay for those who do.

Where, however, the price charged for the water is more than the cost of the supply, another grievance arises—viz., that the rates are lightened at the cost of the consumer of water. If a large ratepayer were not a large consumer of water, it would be his interest to have the total amount to be raised by rates lightened by the surplus profit derived from the water-works.

9. The Committee, after full consideration of these cases, think that the sound principle to lay down is, that water supplied by a Sanitary Authority should be paid for by the consumer; but as it appears that this principle, if carried out to its full length, might, in some cases, cause the charge for water to be very high, it seems desirable that a maximum of charge on the consumer of water should be established.

On the other hand, it has been shown to the Committee that it is desirable to establish a minimum.

It is obvious that a fair charge made directly on the houses benefited will tend to disarm the opposition which now arises on the ground that the cost of the water-works will be thrown on the rates.

10. The Committee have had two suggestions made to them, which, although they differ as to the means, agree as to the principle.

One witness—Mr. H. Owen—suggested that the Local Government Board shall have power to establish the maximum and minimum of charge on the application of ten ratepayers of the district.

The other witness—Colonel P. Cox, R.E.—suggested that a maximum and minimum should be laid down in an Act; and for that purpose he proposed that 6d. in the pound on the rateable value of the house should be the minimum, and 2s. in the pound the maximum. It may be observed that the maximum of 2s. in the pound on a cottage rated at £4 per annum is less than the sum of 2d. per week, or 8s. 8d. per annum; and the minimum of 6d. is less than ¼d. per week. Further information on these two suggestions will be found in the paper handed in by Mr. H. Owen, and in the paper handed in by Mr. Pell, a member of the Committee.

11. The Committee recommend the adoption, in an Act of Parliament, of the maximum and minimum suggested by Colonel Cox. The necessity for this suggestion will be found in the evidence given in reply to questions 918 to 922.

[The four clauses suggested by Colonel Cox were the following:—

"Where the Sanitary Authority has established works of water supply for their district, they shall keep a separate account of all their receipts, credits, payments, and liabilities from or on account of the water-works undertaking, to be called 'the water account,' which account shall be subject to the same provisions as to audit, examination, report, inspection, copies and extracts, and production of vouchers, as other accounts of the Local Board."

"All moneys from time to time received by the Local Board by way of revenue on water-works account shall be applied for the following purposes: 1. In payment of the water-works establishment charges—that is to say, of the expenses properly chargeable to revenue of establishing, conducting, managing, and maintaining the water-works, and works connected therewith. 2. In payment of the interest on the moneys borrowed for the purposes of the water-works. 3. In providing for the discharge of any moneys borrowed for the construction of the works. And the balance, if any, shall be carried to the district-fund or to the credit of the rate for general expenses; but no balance shall be so carried in any year in which the price charged for water exceeds a rate of 6d. in the pound."

"In case the revenue of the Local Board from the water-works undertaking shall in any year be insufficient for the payment of the moneys payable in respect of the same, and chargeable on revenue, the Local Board may in such year, according to the powers and provisions of the Public Health Act, 1875, make and levy a general district rate, to be called 'the water-works rate,' for providing for the deficiency; but such rate, or any part thereof, shall not be levied in any year in which the charge for water is less than a rate of 2s. in the pound."

"For the purpose of diminishing the expense of assessing, making, levying, and collecting 'the water-works rate,' the Local Board may include the same in any general district rate under the Public Health Act, 1875; and may make, levy, collect, and recover such water-works rate as part of any such general district rate."]

III.—*Supply by Water Companies or Corporations.*

12. The Committee have also had their attention called to several questions which arise under section 52 of the Act of 1875. That section appears to be somewhat ambiguous. Its effect is to restrict a Local Authority from providing a water supply when within the limits of supply of a Water Company.

A Water Company often have a district assigned to it, which includes outlying places to which its mains do not at first extend, although it is contemplated that they will do so at a future time. To give to a Water Company the power of supplying a certain district with water, to the exclusion of all others, is to give a power which ought to be exercised within a reasonable time, or else some other body should be found to provide the water, which, in many cases, is urgently wanted.

At present the law says that if the inhabitants of a district within the limits of supply of any Water Company or other Authority which has been appointed to supply the water, will guarantee 10 per cent. for three years of the cost of the mains and pipes to be laid down by the Water Company or other Authority, then the latter shall be compelled to lay down the mains and provide a water supply. Doubts have been expressed as to whether the Sanitary Authority could give the guarantee required, in place of the inhabitants, and charge the same on the rates.

13. It would appear that the words of sub-section 3 of section 51 of the Act of 1875 are wide enough to cover the case; for it says that "a Local Authority may contract with any one for the supply of water." But if there is any doubt about the matter it ought to be removed. Mr. Easton, the witness who raised this question, also pointed out the importance of not limiting the guarantee to three years, but of allowing the Authority to give it until the water rates and rents from the district were sufficient to pay the Water Company the proper return on the cost of the mains and pipes which it laid down, and in that case the guarantee should not be 10 per cent., but 7 per cent. This point also is one which appears to deserve careful attention.

14. With respect to section 52 it has been stated in evidence that "doubts have arisen as to the construction of the section in cases where Local Authorities have been desirous that the Company should exercise these powers, either by themselves supplying the place with water, or by supplying the water to the Local Authority in bulk with the view to their distributing it, or that the Local Authority should themselves execute the necessary works of water supply." (See "Mr. Owen's Memorandum of Suggestions," p. 122. "Construction of Water-Works by a Sanitary Authority within the Limits of Supply of a Water Company.")

A suggestion has been put forward by Mr. Owen which will be found in the paper handed in by him. The object may be shortly stated as follows:—Where a district within the limits of supply of a Water Company is unsupplied, the Local Authority may require them to determine whether they will allow the Local Authority to supply, or whether they will supply the district with water themselves, or supply water in bulk so that the Authority may distribute the water.

If the Company inform the Authority of their willingness to supply, they are to name a period before the expiration of which they will supply the district; and then they retain their right to supply, to the exclusion of the Local Authority.

If the Company determine to supply the Local Authority in bulk, they shall state the price, the quantity, and condition of the supply.

Provision is made for referring to arbitration any dispute which may arise as to the reasonableness of the time within which the supply is to be provided, if the Water Company provide the supply, and also as to the price, quantity, and condition, if the Water Company agree to supply the Authority in bulk.

If, after an arbitration, the Company decline to supply, then the Local Authority may supply, as if the district were not within the limits of supply of a Water Company. Further provision is made that, if the Local Authority is supplied in bulk they may distribute the water, and also if the Water Company fail to do what they have undertaken, then the Local Authority may supply the district as if it were not within the limits of supply of a Water Company.

The same regulations which apply to a Water Company should apply to any Corporation supplying water.

15. The Committee, bearing in mind that many places within the limits of supply of Water Companies are unsupplied, think that these propositions are reasonable, and, therefore, recommend them to the attention of Parliament.

IV.—*Water Supply to Rural Districts in Certain Cases.*

16. The Committee have had their attention drawn to the fact that a Rural Sanitary Authority have not the power to oppose by Counsel a Bill in Parliament, by which it is proposed to take water from their district though they can petition against it.

An Urban Sanitary Authority, on the other hand, can oppose by Counsel a Bill, subject to the conditions laid down in the Municipal Corporations (Borough Funds) Act; and it has been suggested to us that a Rural Authority should have the same power.

The Committee, however, do not approve of that course; but it does appear right that some remedy should be found whereby the wants of any rural district from which a water supply is to be taken for some large town should be considered, before the Act or Provisional Order authorizing the supply to be taken is passed by Parliament.

It also appears that the wants of the rural districts through which the proposed water-main will pass should also be considered by Parliament before the works are sanctioned.

17. The Committee therefore recommend that where a Water Company or Sanitary Authority go to a rural district for water, or where their mains pass through a rural district which is in want of water, they shall be compelled to supply the Rural Sanitary Authority of that district with water in bulk, at a cost which, failing agreement, should be settled by arbitration. The Rural Sanitary Authority in that case should generally undertake the distribution of the water.

In order that Parliament may have full information as to the wants of any rural district from which the water is to be taken, and through which the proposed water-main is to pass, a report should, in all cases, be made to Parliament by the Local Government Board, which, following the practice of Parliament, would be referred to the Committee who are charged with the examination of the Bill or Provisional Order, by which the powers are given.

The report should state—

What are the probable wants, as regards water supply, of the district from which the supply is to be taken, and of the districts through which the mains pass;

Whether it is necessary for the districts to obtain a supply from the proposed works; and

Any other information which it is important for Parliament to know.

These provisions, if carried out, would, in the opinion of the Committee, help to solve the problem of water supply which is now attracting such great attention.

V.—*Summary of Recommendations.*

18. The Committee recommend that the Local Government Board should have power to issue Provisional Orders, which, when confirmed by Parliament, would confer upon the Local Authorities the power to purchase water rights compulsorily, such Provisional Orders to put in force the Water Clauses Act, 1847.

That in all cases where the Local Authority provide a water supply, water-rates or water-rents should be charged upon the consumers; the maximum of charge to be 2s. in the pound on the rateable value of the house, and the minimum 6d. in the pound.

That a Sanitary Authority should have power to guarantee 10 per cent. for three years of the cost of the mains and pipes to be laid down by the Water Company, or 7 per cent. until the water-rates and water-rents are sufficient to pay the Company the proper return on the cost of the mains and pipes.

That section 52 of the Act should be made more explicit.

That where a Company or Corporation go to a rural district for water, Parliament, before giving the powers sought for, should be informed of the wants of the district from which water is proposed to be taken, or through which the main passes, in order to make provision for these districts.

Reductions in the Price of Gas.—At the meeting of the Leeds Town Council on Wednesday, the 5th inst., it was resolved to reduce the price of gas from 2s. 9d. to 2s. 6d. per 1000 cubic feet, to take effect from the 1st of July, the same discount being allowed as at present—viz., 2½ per cent. on all accounts paid within one month of the date of delivery. The Directors of the Runcorn Gas Company, at their meeting on Thursday last, decided to reduce the price of gas 4d. per 1000 cubic feet, on and after the 1st of July next. This reduction is the second during the present year, the last having taken effect on the 1st of January last. The price is now 4s. 2d. per 1000.

Legal Intelligence.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

TUESDAY, JUNE 4.

(*Before Vice-Chancellor* MALINS.)

GLOSSOP *v.* HESTON AND ISLEWORTH LOCAL BOARD.

This case, which has been so frequently before the Court, again came on to be argued to-day.

Mr. GLASSE, Q.C. (with him Mr. STURGES), reminded the Court that the writ in the action was issued so far back as July 12, 1876, from which time, notwithstanding all the efforts made, the plaintiff had been unable to get rid of the nuisance of which he complained, or to obtain a decree that the defendants should find some mode of relieving him from it. He asked to restrain the defendants, by injunction, from permitting sewage or other offensive matter to pass into the River Crane in such manner as to render the water in the river, at or near the plaintiff's residence, unfit for use, or injurious to the health or comfort of the plaintiff and his family there. It had long been settled that the fact of a stream being fouled by others was no answer; and the Court would restrain any new communication, suspending the operation of its order for a greater or less time, as it thought fit. When the case was last before the Court, his lordship had selected Lieut.-Col. Hope to make an inspection on the spot, and report to the Court thereon. That gentleman had so inspected, and now reported that the river was in such a state as materially to interfere with the comfort and enjoyment of the plaintiff's residence, and that this condition arose from the sewage or other offensive matter now flowing into the river through the drains or channel under the defendants control. Reference was then made to the cases of *Attorney-General v. Birmingham; Attorney-General v. Leeds; Goldsmidt v. Tunbridge Wells; Stokes v. Banbury*, and the Public Health Act; and it was contended that the plaintiff was entitled to the order asked, with the costs of the suit up to the hearing.

His LORDSHIP: I do not want to hear this case all over again. I have heard it twice. I retain the opinion I before expressed, that Mr. Glossop has sustained injury, which opinion is confirmed by Colonel Hope's report, and by the defendants own minutes which amount to an admission of nuisance.

Mr. HIGGINS, Q.C. (Mr. METHOLD with him), proceeded to argue the case for the defendants, characterizing Colonel Hope's report as a document of great ingenuity and considerable eloquence, but, taken as a whole, of little practical value, because he only paid two visits to the *locus in quo*—on one of which, a week day, he discovered no nuisance; on the other, a Sunday, a *dies non*, he could do so.

His LORDSHIP said he thought it would be better to make an order, following the decision in *Attorney-General v. Leeds*, granting an injunction, leaving the defendants to find a mode of obeying it. The question would then be what time should be given the defendants.

Mr. HIGGINS reminded the Court that the drains referred to had existed 50 years, and that the increase of population during that time had only been from 5000 to 10,000.

His LORDSHIP said he could see very well that Mr. Glossop had not a perfectly pure stream now probably he had not had it for 40 years—but whether the defendants were responsible for it, and could abate it, he did not know. Granting the injunction, he would give the defendants time.

Mr. GLASSE said he was ready to take an order refusing the injunction, and upon that go to the Court of Appeal.

His LORDSHIP, however, said he was bound to make the order most in accordance with his views, and, therefore, he would grant the injunction, giving a delay of six months, with liberty to apply. Costs of the suit to include costs of motion, and what was properly paid to Colonel Hope.

Miscellaneous News.

SOUTH METROPOLITAN GASLIGHT AND COKE COMPANY.

An Extraordinary General Meeting of Shareholders was held on Monday, June 3, at the Terminus Hotel, London Bridge—T. B. SIMPSON, Esq., in the chair—"for the purpose of increasing the number of the Directors of the Company by the appointment of an additional Director, and to confirm the resolution passed at the last half-yearly meeting for increasing the remuneration of the Directors."

The SECRETARY (Mr. George Livesey) read the advertisement convening the meeting, an extract from the minutes of the last general meeting, bearing on the matters of the present meeting, and the legal opinion which the Directors had taken as to the proposed increase in the number of the Directors, which it was stated, for various reasons, was a perfectly valid proceeding.

The CHAIRMAN then said: Gentlemen, the remarks which our Secretary has just read will obviate any necessity on my part to introduce the matters for your consideration. We have met for the purpose of carrying out the resolution which you so properly passed on the former occasion. We thought it safer—although I myself had no doubt of it previously—to take that sort of opinion which all the Proprietors would be contented to receive. Our Secretary has read to you the opinions so obtained. On this occasion, too, we have our Solicitor with us, and if any gentleman has any doubt, or question to ask him, I am quite sure he will be ready to state to you what his opinion is, or give you an answer to any other legal question which you think you are entitled to ask. In order to save your time, I think I may at once say that we have met first of all to carry out the intention of electing a Director, and, if you please, we will proceed to that at once. I shall now be pleased to receive any proposition. I believe there is one candidate.

Mr. BUTLER said he did not understand the legal bearings of the case; but he thought that the Solicitor—whom he begged to thank—had given such reasons as would commend themselves to the common sense of the Proprietors; and he thought they could have no difficulty in electing a sixth Director, and as many more hereafter as they might wish. He moved—"That the number of the Directors of the Company shall be increased from five to six."

Sir CHARLES D. CROSLEY felt quite sure that none would regret the step that had now been taken in increasing the number of Directors from five to six. Although they had a very able body of gentlemen now managing their affairs—and he was quite sure they were all most grateful to them for the manner in which they had conducted matters—nevertheless, he thought that in an important Company like this, which was second to none—indeed, it ranked highest of all the Gas Companies as to management, as was seen by the extra dividend the Proprietors were getting—none would regret increasing the number of the Directors, because there were times when the Directors were absent through unforeseen circumstances—through illness, or from other causes; and there might be important business to attend to at the Board. He believed, too, that "in the multitude of counsellors there is wisdom." He had much pleasure in seconding the resolution.

The resolution was then put and carried unanimously.

Mr. BUTLER said the only candidate was Mr. Simpson Rostron, and he had great pleasure in proposing that gentleman. He had been a large Shareholder for some years past; he was a man of considerable ability, and he could not help thinking that he would be an acquisition to the Board. It was a very nice thing for the Directors to feel that they could now and then leave their posts, and that there was a sufficient number to carry on the business of the Company without any detriment. He had great pleasure in proposing Mr. Rostron.

Mr. HARRISON seconded the resolution, which was carried unanimously.

Mr. BUTLER then moved—"That the remuneration of the Directors of the Company be increased to £1500 per annum from the 1st of January last, and to £1800 per annum from the 3rd of June, 1878." He thought he need hardly repeat what had been said on so many occasions as to the debt of gratitude which the Shareholders felt to the Directors. It had been without doubt one of the best managed of the Gas Companies in this country, or any other, and they felt deeply indebted to the Directors. He only hoped that they would be as prosperous in the future as they had been in the past.

Mr. HEARNE seconded the motion, and briefly expressed the very great pleasure he felt in doing so.

The resolution was carried unanimously.

The CHAIRMAN, in reply, said: Gentlemen, I am sure I thank you sincerely on the part of the Directors, and those who follow me will see the increase with pleasure. I think it is a very liberal sum, and on their part, as well as on my own, I thank you for this courteous proceeding, for which we must be grateful.

Mr. ROSTRON, who then took his seat at the Board table, said: Mr. Chairman and gentlemen, it is now my duty, and also a pleasure, to rise and thank you for the very cordial way in which you have received my name, and also for the very unanimous manner in which you have elected me a Director of this Company. I wish to take this opportunity of thanking publicly those Shareholders who are not here present to-day, but who have in the very kindest way either sent me their proxies before it was known whether there would be a contest, or who have written to me expressing, in the very kindest terms, their wishes for my success. Among those who have done so are many of the largest Shareholders, both ladies and gentlemen. I can assure you that the confidence expressed in me was unexpected, but I attach a very high value to it, and its exhibition is most gratifying to me personally. You will not expect me to say anything of the policy of the Company on this occasion, beyond stating that the policy which has given us success in the past will not fail us in the future. All that remains for me to say, in conclusion, is that although I know that there are others whose holdings are much larger than mine, and who are older Shareholders, yet I enter office with the full determination and desire to do my duty, and to do so by finding out, and then promoting what I consider the real interests of this Company.

Sir CHARLES D. CROSLEY proposed, and Mr. MALTBY seconded, a vote of thanks to the Chairman.

The motion was unanimously agreed to, and having been acknowledged, the proceedings terminated.

PHŒNIX GASLIGHT AND COKE COMPANY.

An Extraordinary General Meeting of Shareholders was held on Wednesday, June 5th, at the Offices, 70, Bankside—J. SHAND, Esq., in the chair—"for the purpose of making a call of 10 per cent. on the new stock, payable on the 1st of July next."

The SECRETARY (Mr. I. A. Crookenden) having read the advertisement convening the Meeting,

The CHAIRMAN moved the following resolution:—"That a call of £10 per centum on the new stock be made upon the several Subscribers and Proprietors of this undertaking, according to their registered amount of that stock, and that such call be paid into the hands of the Treasurer, Robert Cooper Lee Bevan, Esq., at 54, Lombard Street, E.C., on or before the 1st day of July next."

Mr. LEONARD SHUTER seconded the resolution, which was carried unanimously.

The proceedings, which were purely formal, then terminated.

METROPOLIS GAS SUPPLY.

CHELSEA VESTRY.—At the meeting of this Vestry on the 4th inst., a letter was read from the London Gas Company, with reference to the existence of carbonic acid in their gas, as alluded to in the report of the Vestry's Gas Examiner. The Company stated that the existence of carbonic acid is not referred to as an impurity in any of the Acts of Parliament, but that they and every Gas Company would be happy to be rid of it, could they do so without nuisance to the neighbourhood. Dr. Barclay said that, although the presence of carbonic acid gas was not referred to in the Act of Parliament, it was none the less an impurity, diminishing the illuminating power of the flame of gas in proportion to its presence. The gas of the London Gas Company contained a much larger proportion of carbonic acid than usual. As far as he could remember off-hand, every 5 per cent. of carbonic acid caused a diminution of one candle in the illuminating power of a gas flame. Dr. Barclay was requested to present a written report on the subject. The Board also resolved to instruct their Solicitors to take measures for observations to be kept on the gas nuisance at Fulham from June to November.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health, on the Composition and Quality of the Metropolitan Waters in May, 1878:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.—As Nitrates, &c.	Ammonia. Saline.	Ammonia. Organic.	Hardness (Clark's Scale). Before Boiling.	Hardness (Clark's Scale). After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	19·40	0·066	0·120	0·000	0·009	13·2	2·8
West Middlesex	19·20	0·084	0·120	0·000	0·010	13·2	3·3
Southwark and Vauxhall	19·60	0·077	0·135	0·000	0·009	13·2	3·2
Chelsea	18·40	0·056	0·135	0·000	0·007	12·6	3·7
Lambeth	20·60	0·063	0·156	0·000	0·008	13·7	3·4
Other Companies.							
Kent	32·00	0·001	0·450	0·000	0·001	20·6	7·5
New River	17·60	0·024	0·144	0·000	0·005	12·6	3·7
East London	18·10	0·049	0·135	0·000	0·007	12·1	3·2

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases.

C. MEYMOTT TIDY, M.B.

PHŒNIX GAS COMPANY'S NEW GASHOLDER.

The accompanying engravings are the first of a series which it is intended to publish, exhibiting plan and details of construction of the new large gasholder in course of construction for the Phœnix Gas Company, on their premises in Kennington Lane, in the parish of Lambeth, from the designs, and under the direction of their Engineer, Mr. Corbet Woodall, M. Inst. C.E., who is also the President of the British Association of Gas Managers for the present year. The holder will be 215 feet in diameter, in two lifts of 44 feet each, and its capacity 3,100,000 cubic feet.

The size of this holder was determined by the exigencies of space. The ground upon which it is being erected was purchased by the Phœnix Gas Company in 1847, from the Southwark and Vauxhall Water Company, who had previously used it as a pumping and storeage station. In that year the Phœnix Company erected their first holder upon this site, and since that period the premises have been gradually occupied by other holders, until there was left room sufficient only for one of comparatively small size.

When the Gas Company acquired the property, there were two reservoirs on the ground, which had been constructed by their predecessors—the Water Company—and one of these, 152 feet in diameter and 18 feet deep—was selected as suitable for the erection of the first gasholder, which was a double-lift one, and had a diameter of 150 feet. Although this holder was in every respect well built, its proportions were so radically faulty that it was a source of constant anxiety while working. A heavy wind, or any slight obstruction to the inner lifts, would cause it to tilt on one side, and the carriages and guides were several times broken in consequence.

It having lately become necessary for the Company to increase their storeage capacity, it was determined to replace the original holder by one of much larger capacity, and the old one was consequently removed last year. It will be seen from this that the storeage room of the Company is not increased by the whole capacity of the new holder, but by the difference between it and that of the one displaced, the gain being 2½ million cubic feet.

The contract for the erection of the new tank provided that, when completed, the tank should be a true cylinder, 218 feet in internal diameter, and 44 feet 6 inches deep from the top of the coping-stone to the top of the footing, the latter being 2 feet deep, and the total depth of wall 46 feet 6 inches, except at positions where connecting-pipes are carried through the wall, where it is taken down to the depth shown in drawing No. 3.

In making the necessary excavation, a trench of uniform width was dug, sufficient to allow of the building of the wall and piers—*i.e.*, with a radius on the outside of 117 feet, and on the inside of not more than 105 feet, carried to a depth of 26 feet 6 inches from the datum line, which datum was 2 feet above the level of the finished coping. Below that depth to the bottom of the trench, the outside radius was reduced to that of the outside of the tank wall—viz., 112 feet 9 inches, a level bench being formed where the width was altered.

From the bench to the bottom, timber chases, or "set-offs," were excavated on the outside of the trench, so as to admit of the building of the piers or counterforts, and at the level of the footings both of the wall and piers, all round the tank, the trench was excavated to a further width of one foot, to provide for the widening of the foundation. In the position shown on the drawings, a chamber of the size and to the depth marked was excavated to admit of the construction of the pipe-well, the timber in this chamber or recess being left in from the bottom up to the level of the concrete floor, where the brick well commences.

The depth to the bottom of the trench, measured from datum line, is 46 feet 6 inches, and the bottom was completely finished to a perfect and uniform level before the erection of the wall was commenced. After the erection of the tank wall, the earth inside was removed, so as to form a mound of the shape and dimensions shown in the drawings, the surface of the mound being cut and finished perfectly smooth.

The general dimensions of puddle are as follows:—Surrounding wall and intermediate piers, and sides of principal piers above the bench in the excavation, 2 feet thick at bottom, diminishing to 1 foot 6 inches at top; behind the principal piers, above the same line, 1 foot thick, or any greater distance required to fill in between the pier and the side of the trench, there being no other backing behind the piers. Except where otherwise provided, the puddle in no place is less than 1 foot 6 inches thick. The whole of the excavated space round the pipes inside the tank, and the whole excavated space outside the tank, to the level of the concrete foundation of the brick wall is filled solidly with puddle. From the concrete foundation to the surface, the whole space between the walls of the well and the tank is filled with puddle, and the remainder of its circumference is surrounded with puddle 1 foot 6 inches thick. The bank round the tank is carefully built up in horizontal layers of 1 foot deep, and was brought up regularly as the well approached completion, so that the puddle should be properly backed up. When the surface of the bank is finally finished, it will have an uniform slope, and be covered with garden mould, and prepared for sowing with grass seed. A gravel path round the tank will be made after the gasholder is completed. The path will finish against a tile edging, with rounded top tiles 7 inches deep, and 1½ inch thick.

(*To be continued.*)

THE THIRLMERE WATER SCHEME.

At the Meeting of the Manchester City Council, on Wednesday last—the MAYOR (Alderman Grundy) presiding—the following report, prepared by the Town Clerk, with reference to the proceedings before the Examiner in the House of Lords on the Thirlmere Bill, and the subsequent refusal to suspend the Standing Orders of the House, was read:—

"As the Council are aware, the Examiner in the House of Lords has reported that, in the case of the Thirlmere Bill, the Standing Orders had not been complied with, inasmuch as the notice published in November last contained no reference to the clauses 58 and 59, which were inserted in the Bill in pursuance of the instructions given to them by the House of Commons, by the Select Committee to which the Bill was referred; and the Council will also have heard, and no doubt with much surprise, that, upon appeal to the Standing Orders Committee of the Lords, over which Lord Redesdale presides, their lordships determined that the Standing Orders could not be suspended, or the Bill allowed to proceed. It was contended, on behalf of the Corporation, before their lordships Committee, with truth, but unfortunately without effect, that the insertion of the clauses was the act of the Select Committee in pursuance of the instructions given to them by the House of Commons; that such clauses were not sought for or desired by the Corporation, but were actually imposed upon them by the Committee; that not being at that time either desired or contemplated, they could not possibly be referred to in the notices published in November; and, further, that no living being except the Corporation could by any possibility be prejudicially affected by the clauses, or damnified by the want of notice, as the only effect of the clauses was that a portion of the water to be obtained by the Corporation from Thirlmere might, under certain circumstances, if desired by the Local Authorities, be claimed for the benefit of other districts. It is lamentable to think that, as the consequence of undue regard, as it appears, to mere technicalities and form, all the time and money spent by the Corporation in promoting this important Bill will, to a large extent, be thrown away, and not as the consequence of any act or default of the Corporation, but of something done, in the supposed interests of the public, by the House of Commons. It is at any rate satisfactory to believe that, if obliged to wait until the next session, the Corporation may then reasonably expect to receive the support of the Government and of the House of Commons. The Town Clerk is not able at present to report as to the possibility of the decision of the Lords Committee being reconsidered, but it is in his opinion not probable that any further steps will be taken with that object."

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of this district shows no sign of improvement, and business, apart from the generally depressed condition of the market, is naturally being affected by the advent of the Whitsuntide holidays, advantage of which will, in the Manchester district, be taken to close the majority of the pits for the whole of the week.

With regard to the gas coal trade, the amount of business doing is only limited, as it is still very difficult to place contracts, except at extremely low prices, and for long forward deliveries. The impression in some quarters is that Gas Companies, in many cases already pretty well bought for their present requirements, are simply endeavouring to take advantage of the exceptionally depressed condition of the market to secure contracts with long delayed deliveries at very low figures, and that therefore they are independent about closing, except on pretty much their own terms. Of course it is only natural that Gas Companies should endeavour to profit by their experience of the coal famine prices, and as there are not a few colliery proprietors who, either from necessity or want of confidence in the future, are willing to enter into contracts at very low figures, forward supplies have in some cases been secured on what will probably prove to be very advantageous terms. Many of the large firms, however, are holding back for the present, as they are not disposed to enter into engagements except at what they consider to be fair prices.

In other classes of fuel there is no material change, the reduced prices, which, in the majority of cases, had been fully discounted before, having had no perceptible effect upon the market. The demand both for house coal, steam and forge coal, and engine classes of fuel is still very limited, and, so far as prices at the pit mouth can be quoted, they may be given at about 10s. for best Wigan Arley, 8s. to 8s. 6d. for second qualities, 7s. to 7s. 6d. for Pemberton four-feet, 5s. 6d. to 6s. for common coal, 4s. to 5s. for burgy, and 2s. 9d. to 3s. 6d. per ton for ordinary slack.

The colliery proprietors in the Manchester district have reduced the wages of their men about 10 per cent., and this is generally being submitted to without opposition.

At a meeting of miners delegates held in Manchester, on Tuesday, a new miners union was formed, with the name of the General Amalgamated Association of Miners, under the leadership of Mr. T. Halliday.

The iron trade of this district continues in a very inanimate condition, the inquiry either for raw or manufactured iron being extremely small; but prices nominally are without change from last week.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The exportation of Durham coals from the Tyne Dock during last week was 30,000 chaldrons, which was about 2000 chaldrons in excess of the week before. A good few of these coals were gas. The shipments of steam coals were very good, too, from the Northumberland side, and there were proportionate exports from the Wear and Hartlepool. It can hardly be said, however, that prices are maintained. The highest figure realized for gas coals in the open market cannot be said to exceed 7s. per ton; and 5000 tons of an excellent medium quality of gas coals, from a colliery which stands well in the market, were bought last week at 6s. per ton net. Second-class gas collieries continue to work very badly.

The coasting shipping trade favours shippers. Rates are low to every part of the British Isles, and are equally flat for France, Hamburg, Holland, and the Scandinavian ports. Some ships were engaged last week to carry gas coals to Ireland at a very moderate rate of freight. There were a good few small coasting vessels in the market last week, which it seemed almost impossible to fix at any price. Steamers freights are likewise lower to the Baltic, Cronstadt, and the Mediterranean. There was a drop of nearly £1 per keel last week.

The iron, chemical, and general manufacturing trades of the North are beginning to feel a little favourable reaction. There is no material improvement in prices, but the tone of trade is better. Foreign merchants—with the fact that England and Russia are now to submit their differences to a Congress—are more disposed to buy goods at the present rates, and some few elements of speculation begin to show themselves. Of course, the whole affair is extremely small, but the slightest improvement in business, after so long and painful a depression and heavy losses in the great staples of the Northumberland and Durham industry, are looked upon with satisfaction.

The labour market is quiet. The union joiners of Shields are striking against a reduction of wages, but the market is so full of skilled labour that they are being replaced with non-union men very rapidly.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

At the annual general meeting of the Melrose Gas Company, last Tuesday, a dividend of 10 per cent. was declared for the past year, and the price of gas was reduced 5d. per 1000 cubic feet—*i.e.*, from 6s. 8d. to 6s. 3d.

It is stated that Mr. A. F. Wilson, gas engineer, London, has been appointed by the Directors of the Kirkintilloch Gas Company to act on their behalf in the reference between them and the Gas Commissioners in the transference of the undertaking of the Company under the Scotch Gas Act.

At the last ordinary monthly meeting of the Town Council of Helensburgh, the Provost intimated that he was desirous that those members who were of his mind should sign a requisition to call a special meeting with the view of considering the propriety of adopting the Burghs Gas Supply (Scotland) Act.

The annual meeting of the Kettle, Freuchie, and Kettlebridge Gaslight Company was held on Thursday week, when the report submitted showed that the affairs of the Company were in a very healthy state. Various alterations and extensions had been made in connection with the works during the past year, and the appliances were now of such a character as to be capable of making gas at the rate of 8,000,000 cubic feet per annum. The usual dividend of 5 per cent. was declared.

The price of gas in Dundee has been reduced from 4s. 2d. to 3s. 11d. per 1000 cubic feet, with 5 per cent. discount on accounts paid within 28 days. This is the third year in succession in which the price of gas in Dundee has been reduced 3d. per 1000 cubic feet; and, allowing for the 5 per cent.

discount for prompt payment (of which almost every consumer takes advantage) on 3s. 11d. per cubic feet, the actual price during the ensuing year will only be about 3s. 9½d. The reduced price of coal and the increased value of coke and chemical products largely explain the ability of the Commissioners to reduce the price of gas. Although a larger consumption of gas is calculated upon for the ensuing year, the estimate for coals is only £32,000, as against £33,738 last year. The value of chemical products in 1877-8 was £4314, as compared with £2985 in the previous year. The net revenue account for the past year shows a surplus of £3131. With only one exception—namely, Galashiels—Dundee now enjoys the credit of having the cheapest gas in Scotland.

Tenders for the supply of coal gas to be used during the year ending the 30th of September, 1879, have just been accepted by the Gas Committee on the Town Council of Aberdeen. The quantity of coal contracted for is 22,000 tons, at a total cost of £23,902.

In Dr. Wallace's report on the quality of the gas supplied to the city of Glasgow during the week which ended the 1st of June, it is shown that the minimum illuminating power ranged from 26·28 candles to 27·23 candles, the average from 26·50 candles to 27·55 candles, and the maximum from 26·80 candles to 27·86 candles. The western district, or that supplied from the Partick gas-works, again had the highest results.

At a meeting of the Town Council of Elgin, on Thursday week, it was resolved to give the Gas Company a definite offer for their works and plant, the offer being, it is understood, £17 10s. per share. The Gas Company, however, it is said, will submit to arbitration only.

During the fortnight ending on the 4th inst. the delivery of water into Edinburgh was at the rate of 5544·70 gallons per minute, equal to 27·28 gallons per head per day to a population of 292,500. On that day the quantity of water stored in the five reservoirs of the Water Trust was 532,178,320 gallons, against 544,925,320 gallons on the 21st ult.; and 694,231,152 gallons on the correspondating date of last year.

The annual meeting of the Shareholders of the Paisley Water Company was held last Thursday—Mr. A. C. Holms, Governor of the Company, in the chair. The usual dividend of 6¾ per cent. per annum, less income-tax, was announced.

It has been resolved by the Nairn Police Commissioners to submit to the Board of Supervision, for their consideration, a drainage and irrigation scheme that has lately been proposed, and to ascertain if the Board are prepared to recommend the Public Works Loan Commissioners to grant a loan of £6000, as also a sum of £3600, to complete and extend the water-works.

The extensive drainage operations that have been in progress during the past four years in the burgh of Johnstone have just been completed at a cost of little under £4000.

On the recommendation of Mr. James Brunlees, C.E., London, the Police Commissioners of Kelso, his native town, are making arrangements to dispose of the town sewage upon a farm by the process of irrigation, and so comply with the provisions of the Rivers Pollution Prevention Act.

Last week's Glasgow pig iron warrant market fluctuated considerably, and a very large amount of business was done, a decided impetus having been given by the encouraging reports received from Middlesbrough. The more hopeful prospect of a peaceful solution of the Eastern Question also had its due effect on the general tone of trade and speculation. At the close of the week a desire to realize induced heavy "bear" operations, and the prices quickly suffered a decline. On Thursday forenoon prices advanced 10d. per ton, as compared with the closing quotations on Friday week; but by the finish of the week's transactions, on Friday afternoon, the advance was reduced to 3d. per ton. There is now more business doing, combined with more willingness to enter into forward contracts. Several makers have advanced their quotations for shipping brands.

The coal market continues to be exceptionally dull.

Horsham Water Supply.—The water-works in this town have recently passed into the possession of the Local Board. A meeting of the Shareholders of the Water Company was held on the 30th ult., when it was resolved that the Company be forthwith wound up voluntarily. A donation of £5 each was presented to the Directors, and a year's salary was voted to the Secretary and Manager.

Burgess Hill Gas Company.—The annual meeting was held on the 1st inst.—Mr. W. Wood in the chair. The Directors report showed an available balance of £566 0s. 9d., from which a dividend was declared at the rate of 8 per cent. per annum. After placing 3 per cent. on the gas-rental to the renewal-fund, there remained a balance of £132 13s., which was carried to the current year's account.

Lutterworth Gas Company.—The annual meeting was held on the 3rd inst.—Mr. Footman in the chair. The accounts showed that the receipts for gas for the year ending at Lady-day were £788 8s. 2d.; for rent of meters, £43 14s.; for coke, &c., £184 17s. 2d. The Company paid for coal and cartage, £359 19s. 5d. The amount available for dividend was £256 2s. A dividend at the rate of 7½ per cent. was declared, and £56 was carried to the reserve-fund.

Ilkeston Water Supply.—At the monthly meeting of the Ilkeston Local Board, on the 4th inst., the Clerk read a letter from the Public Works Loan Commissioners, stating that they were prepared, as recommended by the Local Government Board, to lend to the Ilkeston Board the sum of £16,000, at 3½ per cent., for the purpose of purchasing the Ilkeston Water-Works, and erecting additional water-works for supplying the district with water. The loan, with interest, is to be repaid by half-yearly instalments, extending over a period of 30 years.

Stockton Corporation Gas-Works.—At the meeting of the Stockton Town Council, on the 4th inst.—the Mayor (Mr. Richardson) in the chair—the minutes of the Gas-Works Committee showed an increase in the production of gas during the month of April of 50,300 cubic feet, as compared with the corresponding month of last year. The Chairman of the Gas-Works Committee said there had been an increase in the make of gas of 12 million cubic feet during the past year, which produced a "nice" sum to carry over to the borough fund.

Hull Gas Supply.—Mr. James Baynes, jun., reports that the results of his testings of the gas supplied to the east district by the Sutton, Southcoates, and Drypool Gas Company during May were as follows:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·01	15·66	15·85
Grains of ammonia per 100 cubic feet	—	—	7·88
Grains of sulphur per 100 cubic feet	—	—	7·90

Mean temperature and barometer in experiment-room:—Temp., 61·30°; Bar. 29·64.

Water Supply of Cambridge.—The following notice from the Authorities of the University has been put in circulation in the town of Cambridge:—

Clare College Lodge, May 22, 1878.

The Lodging-House Syndicate, having had their attention called to the circumstance that much of the well-water in the town is impure and detrimental to health, desire to make it known that they regard it as extremely important that all licensed lodging-houses should be supplied with water from the Cambridge University and Town Water-Works, and that in fixing the prices of lodgings they will always take account of the nature of the water supply. In future lists of licensed lodging-houses, a distinguishing mark will be affixed to houses supplied with water from the water-works, and all persons whose premises are so supplied are requested to give notice thereof to the Rev. F. G. Howard, the Secretary of the Syndicate, in order that their houses may be correctly designated.

Kibworth Gas Company.—The annual meeting was held on the 3rd inst.—Mr. Grant in the chair. The Directors reported that the affairs of the Company were in a healthy state. After making a reduction of 4d. per 1000 in the price of gas, and spending £181 in new mains, they had still a balance left to pay the usual dividend. The sale of gas for the year was 2,192,700 feet, which was a decrease upon the previous year of 95,600 feet, owing, no doubt, in a great measure, to the badness of trade. There had not been so large a consumption in some of the large houses. The receipts had been for gas and rent of meters, £637 9s. 8d.; for coke, tar, and lime, £80 1s. 3d.; street-lamps, £38 16s. 6d. The outstanding accounts were £104 7s. 2d., making a total of £1310 15s. The total expenditure for the year had been £988 1s. 3d., leaving a balance of £322 13s. 9d. The Directors recommended a dividend of 6 per cent. free of income-tax, which would take £240, leaving a balance of £82 13s. 9d.

Lighting Lamps by Electricity.—At the meeting of the Society of Engineers, on Monday, June 3rd, in the Society's Hall, Victoria Street, Westminster—R. P. Spice, Esq., President, in the chair—a paper was read by Mr. St. George Lane Fox, on "The Lighting and Extinction of Gas by Means of Electricity." The author commenced by alluding to what had already been attempted in this direction, with special reference to the pneumatic system proposed some time ago, in which an extra pressure in the gas-mains was made to act upon an apparatus provided for each lamp. He then explained the difficulties that presented themselves, and which led him to design the electric system, which he proceeded to explain, and which has been several times referred to in the Journal. He then proceeded to give an estimate of the cost of applying it, and of the saving that it was expected would result from its use. Taking a district of 3000 lamps, placed 45 yards apart, he estimated the first cost of the system with overhead wires at £4886 15s., and that of the system with underground wires at £7499 5s. The cost of working was placed at 4s. per lamp per annum, for cleaning, lighting, and extinguishing, equal to £600 per annum. The cost of working on the ordinary system, as per estimates supplied by the Gas Companies, was stated to be 18s. per lamp per annum, or equal to £2700. The saving to be effected by the adoption of his system, in working expenses, in gas saved morning and evening by simultaneous lighting and extinction, including interest at 2 per cent., was placed at £3117 9s. 6d. He thus showed that by an outlay of £4886 15s. by the overhead system, or about £7499 5s. by the underground system, an annual saving of £3117 9s. could be effected. By taking the interest upon the outlay at 7 per cent., a net annual saving of £2775 7s. 6d. for the overhead system, or of £2592 10s. for the underground system, would result. With regard to the application of the system in Pall Mall, where 55 lamps were fitted with the apparatus, and placed in the circuit, Mr. Fox explained that, owing to faulty mechanical construction in some of the details of the lamp apparatus, the working had been interrupted. He was having new and more powerful electrical apparatus made, and he expected very shortly to be able to demonstrate the Pall Mall experiment to be a practical success.

Staffordshire Potteries Water-Works Company.—The annual meeting was held at Hanley on the 31st ult.—Mr. J. Alcock in the chair. The Directors in their report announce an increased rental for the year, exceeding that of the previous year by the sum of £1122 8s. 10d. The balance for the year, and the previous undivided balance of £751, make a total of £6165 18s. 3d., out of which the Directors recommend that a dividend be declared at the rate of 6 per cent. per annum (clear of income-tax), which will absorb £5523, and leave a surplus of £642 18s. 3d. to be carried to next year's account. The Directors have purchased the reversion of Miss Clowes's estate at Leek, and have thereby secured the future interest of the Company in this property. The sinking at the Meir extension has been carried to a depth of about 95 yards, and feeders of water met with in larger quantities than the temporary pumping plant was capable of raising. The plant was increased, and is raising about 800,000 gallons per day from the bore-hole, but up to the present the water has not been lowered to any extent. The Meir pumping-station during the past year has undergone considerable repairs. Two new working barrels and valves of improved construction are now lying at the works ready to replace those at present in use, and which have become defective. The Wall Grange engines have undergone some small repairs, and these, together with the reservoirs and other works, are in good working order. The service and distribution of water to the district continue to receive special attention. The detection and prevention of waste by systematic inspection has enabled the Company to give an improved service over the greater portion of the district. The Chairman, in moving the adoption of the report, stated that the collection of the water-rates had been attended with a loss of 1s. 9d. per cent. in the past year, and in the previous year of only 1s. 3d. per cent., which, he thought, was highly creditable both to the consumers and the collectors, especially when they considered the depression of trade which had prevailed. Mr. Tellwright seconded the motion, and said it was clear that the business of the Company was in very excellent hands. The report was unanimously adopted, and the Chairman proposed a dividend of 6 per cent., which was seconded by Mr. Walker, who congratulated the Shareholders on the magnificent property they possessed, and said the Directors managed it as energetically and carefully as if it were their own private business. The resolution was carried. Mr. John Strick was re-elected auditor, and Mr. Narramore, the continuing Auditor, was thanked for his services. Messrs. C. Keeling, R. Heath, M.P., J. Edge, and B. Boothroyd were re-elected Directors. A vote of thanks was given to the Chairman and Directors for their services.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

2180.—Sweet, A., Hampstead Road, London, "Improvements in cooking and heating by gas." May 31, 1878.

2208.—Daniel, J. A., Halifax, Yorks, "Improvements in taps and valves, and in the manner and apparatus for connecting the same." June 1, 1878.

2228.—Tylor, J. J. and W. A., Newgate Street, London, "Improvements in the arrangements and fittings of water-closets, lavatories, urinals, and other sanitary apparatus, and the parts used in connection therewith, for controlling, regulating, and arresting the flow of liquids and fluids to or from the same, whereby more convenience in use is effected, waste prevented, and greater sanitary advantages obtained." June 4, 1878.

2231.—Heaton, C. W., Lesaness Heath, Kent, "Improvements in purifying gas, and in apparatus employed therein." June 4, 1878.

2233.—Newton, W. E., Chancery Lane, London, "Improved apparatus for exhausting or impelling liquid or gaseous bodies." A communication. June 4, 1878.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

4637.—Bond, F. T., Gloucester, "Improvements in filters." Dec. 7, 1877.
4709.—Rommel, A., Moorgate Street Buildings, London, "Improvements in oscillating pumps." A communication. Dec. 11, 1877.
4813.—Dunn, R., Wylam-on-Tyne, Northumberland, "Improvements in raising water or other liquids, and in the apparatus employed therein, parts of which improvements are also applicable to other similar purposes." Dec. 18, 1877.
433.—Sidon, L. and R., Nottingham, "Improvements in and connected with gas-engines." Feb. 1, 1878.

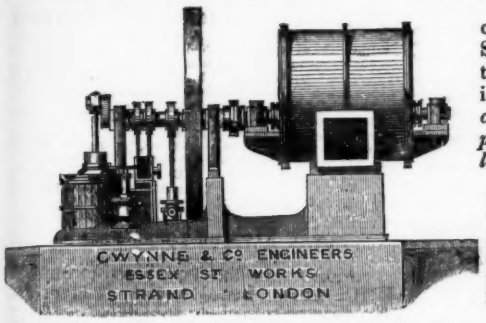
PATENTS WHICH HAVE BECOME VOID.

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1857.—Tylor, A., "Improvements in apparatus and arrangements for controlling, arresting, measuring, and recording the flow of liquids and fluids, and preventing the escape and waste of the same." May 20, 1875.
1865.—Morgan-Brown, W., "Improvements in photometers." May 21, 1875.
1948.—Copp, W. L., and White, C., "Improvements in apparatus for the manufacture of gas." May 27, 1875.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

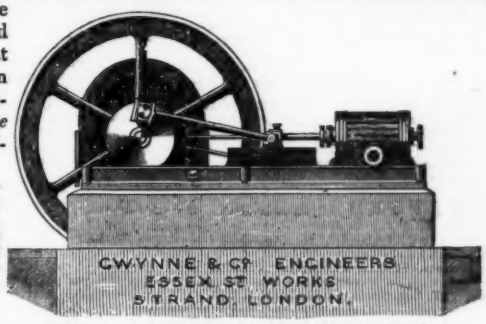
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

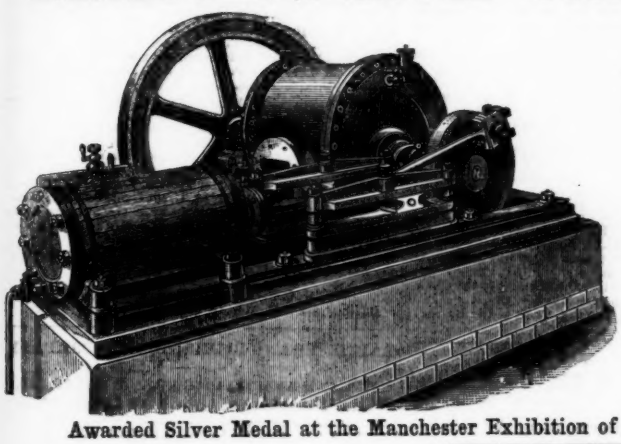
GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS



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SOLE MAKERS,

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MAKERS OF ENGINES, EXHAUSTERS, INDEX AND DISC GAS-VALVES, HYDRAULIC MAIN VALVES, BYE-PASS VALVES, TAR, LIQUOR, AND OTHER PUMPS, SCRUBBERS AND PURIFIERS, CONDENSERS, BOILERS, &c.

Awarded Silver Medal at the Manchester Exhibition of the Society for the Promotion of Scientific Industry.

Phœnix Engineering Works:

HOLLAND STREET, SOUTHWARK, S.E.

TO GAS ENGINEERS.

D. BRUCE PEEBLES & CO.

Beg to call the attention of Gas Engineers to the fact that the novel and original feature in connection with PEEBLES' SYSTEM OF CONTROLLING THE ACTION OF GAS GOVERNORS is the loading or acting on the Bell by Pneumatic Pressure instead of Weights.

TAY WORKS. BONNINGTON, EDINBURGH.

WANTED, by a Gentleman, aged 29, a Situation as MANAGER of a Gas-Works on the Continent or abroad. Advertiser has been about seven years in present situation as Engineer and Manager, where the make of gas is about 150 million cubic feet.

Thoroughly understands the erection of works, also the manufacture and distribution of gas in all its branches. Speaks French and Italian. Can leave present situation immediately. Excellent testimonials.

Address C. E., care of Messrs. Dawson and Sons, Cannon Street, London.

WANTED, Readers of the Pamphlet, "Cooking and Heating by Gas; on Burners," &c. Copies, by post, Threepence, direct from the Author, Magnus Ohren, Gas-Works, Sydenham, S.E.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

WANTED, Orders for Samples to test the superior Silkstone, Wigan, and other Gas Coals and Cannel on Sale by G. J. Everson, Gas Coal and Cannel Contractor, Birmingham.

N.B.—Prices on personal application, or by post or telegram, on shortest notice, and prompt delivery.

THE MALTA & MEDITERRANEAN GAS COMPANY, LIMITED.

NOTICE is hereby given that the ORDINARY GENERAL MEETING of the SHAREHOLDERS of this Company will be held at the Offices, 60, Gracechurch Street, London, E.C., on TUESDAY, the 25th of June, at Twelve o'clock at noon, for the purpose of receiving the Report of the Directors and the Accounts for the year ending the 31st of March, 1878; and the transaction of the general business of the Company.

One of the Directors, Mr. J. B. Paddon, will retire from office, but is eligible for re-election.

The Transfer Books will be closed from the 18th inst. until after the Meeting.

By order of the Board,
F. A. Duffield, Secretary, *pro tem.*

60, Gracechurch Street, June 4, 1878.

A Young Man, aged 22, who has just finished a four years engagement with a provincial Gas Company is open to take a situation as Manager of small Gas-Works, or as Assistant to the Engineer of large Works. Can give first-class testimonials. Has no objection to go abroad.

Address No. 460, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Young Man, aged 22, who has had five years experience in a Provincial Works (make, 75 millions), a SITUATION in a Gas-Works. Can use Photometer, fair Draughtsman, good Writer, quick at figures, and thoroughly understands general routine.

Apply S. I. C. E., 54, Hardress Street, RAMSGATE.

WANTED, a re-engagement as Working MANAGER of Small Gas-Works. Has a practical knowledge of Retort Setting, Main, Service, and Meter Fixing, and Indoor Fittings. Could enter on his duties immediately. Unexceptionable reference.

Address T. S., care of Mr. R. Shadbolt, Gas-Works, FLEETWOOD.

TO GAS ENGINEERS, CONTRACTORS, &c.

WANTED, by the Advertiser, a situation as DRAUGHTSMAN or ASSISTANT ENGINEER. Has had 25 years practical experience in the erection, &c., of Gas-Works. Good references.

Address No. 464, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED immediately, by a Gas Company in South Wales, a respectable young man as RENTAL-CLERK. Applicants must possess a thorough knowledge of the routine of a Gas Office.

Address, in own handwriting, stating age, salary required, with copies of testimonials, No. 465, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BIRSTALL LOCAL BOARD.

METER INSPECTOR.

THE Birstall Local Board require a Meter INSPECTOR and REPAIRER immediately. The person appointed will have to assist in Laying Mains and Services. A plumber preferred.

Applications, in writing, stating wages required, accompanied by testimonials of a recent date, to be sent to me, sealed, and endorsed "Meter Inspector," not later than Friday next.

JNO. SMITH, Solicitor, Birstall, near Leeds,
Clerk to the Board.

Birstall, near Leeds, June 8, 1878.

TWO Purifiers, 6 ft by 4 ft., 6-in. Valves and Connections, with Lifting Apparatus and Girders complete; also a Set of Twelve Pipe Condensers, all in working order, to be SOLD, a bargain.

Apply to Manager, Gas-Works, ENFIELD.

ON SALE—A Station-Meter (with new Drum), capable of passing 10,000 cubic feet per hour, with Hydraulic Valves, Bye-Pass, &c.; 10-in. Connections. Has been removed to make room for one of larger capacity.

For particulars and price, apply to GEORGE NEWTON, Gas-Meter Manufacturer, Union Street West, OLDHAM.

ON SALE—One Station-Meter, to pass 1000 cubic feet per hour. Almost new. Will be sold cheap.

Apply to J. HALL, Gas-Works, St. Helen's, LANCS.

RIPON CORPORATION GAS-WORKS.

EXHAUSTER for Sale (by Dempster), with Engine, Bye-pass Valve, and Governor complete, capable of passing 3000 cubic feet per hour. Has been five years at work, and is in good repair, being sold to make room for a larger one.

Apply to GEO. IRVINE, Gas-Works, RIPON.

TO GAS COMPANIES AND OTHERS.

THE East Retford Gas Company, Limited, have on SALE the following:—

One 4-Horse Vertical Steam-Engine, high pressure, 6-in. Cylinder, 12-in. Stroke, 4-ft. Fly-Wheel, Pump, Governors, and Stone Bed.

One 8-Horse Vertical Steam-Engine, high pressure, 8-in. Cylinder, 16-in. Stroke, 6-ft. Fly-Wheel, Pump, Governors, and Stone Bed. Has only been in work Four years, and is in first-rate condition.

The above can be inspected at the Gas-Works. Have been removed to make room for one of larger size.

Offers to be made to F. BAILEY, Manager.

FOR SALE—Two Purifiers, measuring 8 ft. by 8 ft., and 4 in. deep, with Lifting Apparatus. They are in excellent condition, and have been put out of use by larger ones.

Apply to Mr. OATLEY, Gas-Works, New Southgate, MIDDLESEX.

TO BE SOLD—The Watlington Gas-Works, Oxon.

Apply to J. W. DAVIS, George Street, HULL.

GAS-WORKS TO LET.—The Directors of the Yatton Gas Company, Limited, are desirous of receiving TENDERS for taking the YATTON GAS-WORKS for a term of Seven or Ten years.

Form of lease can be seen on application to the Chairman, Mr. W. H. SAY, Yatton, from whom, or from the Secretary, Mr. SAMUEL DAWES, Clevedon, all further particulars can be obtained.

Approved security to the amount of £500 for the due fulfilment of terms of lease will be required.

Tenders to be sent to the Chairman on or before Saturday, the 22nd inst.

The Directors will not necessarily accept the highest or any tender.

THE Nantwich Gas Company, Limited, are prepared to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR produced at their Works from the 1st of July.

Tenders to be sent to the Manager on or before the 15th of June.

Gas-Works, Nantwich, Cheshire, May 25, 1878.

THE Directors of the Yeadon and Guiseley Gas Company invite TENDERS for the Supply of about 2800 Tons of GAS COAL, and 200 Tons of CANNEL COAL, both kinds to be well screened, and free from bats, pyrites, and dirt, to be delivered at Guiseley Station, or at the Gas-Works in Yeadon, in such quantities, and at such times, as may be required during the Twelve months ending June 30, 1879.

The right to order all or any part is reserved.

Sealed tenders are to be sent to me, the undersigned, on or before Tuesday, the 18th inst., endorsed, "Tender for Gas Coal."

The Directors do not bind themselves to accept the lowest or any tender.

By order,
EDWARD LISTER, Manager and Secretary.

Gas Office, Yeado.., June 6, 1878.

THE Directors of the Surrey Consumers Gas Company are desirous of receiving TENDERS for the surplus TAR and the whole of the AMMONIACAL LIQUOR produced at their Works for Twelve months, from the 1st of July next. The Tar and Liquor will be delivered free into barges at the Company's wharf, and is to be paid for monthly.

Further information can be obtained on application at the Company's Offices, Rotherhithe Street, where the tenders are to be sent in, on or before Thursday, the 20th of June.

The Directors do not bind themselves to accept the highest or any tender.

W. P. BODDY, Secretary.

Rotherhithe, June 11, 1878.

TENDERS FOR GAS COAL.

THE Directors of the Oakengates and St. George's Gas Company invite TENDERS for the Supply of 1200 Tons of Well-Screened GAS COAL, as free as possible from sulphur, bats, bind, refuse, and dirt, to be delivered free at the Great Western Railway Station, Oakengates, in such quantities as may be required, between Aug. 1, 1878, and Aug. 1, 1879.

Tenders (of which the Directors do not bind themselves to accept the lowest or any) must be sent to the undersigned not later than July 1.

GEORGE PARKER, Manager.

Oakengates, Salop, June 8, 1878.

GAS TAR AND AMMONIACAL LIQUOR.

WANTED, Tenders for the above products, or either of them, for One or more years, from the 1st of July next. Quantity, about 10,000 Gallons of each per annum.

Tenders to be sent on or before the 21st of June to the undersigned, who will give any further information.

JOHN PATTINSON.

Gas-Works, Cockermouth.

LEIGH GAS-WORKS.

THE Gas Committee of the Leigh Local Board invite TENDERS for Supplying, Fitting, and Affixing the IRONWORK for Retort and Purifying House Roofs, the particulars of which may be obtained from the Engineer.

Sealed tenders to be addressed to the Chairman, marked "Tender for Ironwork of Roofs," and delivered on or before the 18th inst.

The Committee do not bind themselves to accept the lowest or any tender.

JOSEPH TIMMINS, Engineer, &c.

Leigh, Lancs.

TO IRONFOUNDERS.

THE Gas Committee of the Buxton Local Board invite TENDERS for the Supply of about 1680 Yards of 12-in. Turned and Bored Cast-Iron PIPES.

Specification and forms of tender to be had of Mr. G. Smedley, Gas-Works, Buxton.

Tenders, endorsed "Gas-Pipes," addressed to the Chairman, must be sent in on or before Monday, the 24th inst.

JOSIAH TAYLOR, Clerk to the Board.

Buxton, June 6, 1878.

TAR AND AMMONIA WATER.

TO BE DISPOSED OF, the Tar and AMMONIA WATER produced at the Merthyr Tydfil Gas-Works.

The Directors of the Company will be glad to receive offers to purchase the same for a period of Three or Five years.

Particulars as to quantity, &c., may be obtained of the undersigned.

The right to accept or refuse the highest or any offer is reserved.

By order,
J. L. COCKER, Secretary and Manager.

Gas Office, Merthyr Tydfil, Glamorganshire,
May 20, 1878.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Accrington Gas and Water Works Company invite TENDERS for the TAR and AMMONIACAL LIQUOR produced at their Accrington Works for One, Two, or Three years, from July 1 next. Quantity of coals carbonized about 8500 Tons.

Any further information can be had on application to the undersigned.

Tenders, endorsed "Tender for Tar and Liquor," to be sent in not later than Thursday, the 13th inst., addressed to the Chairman, Gas and Water Works Company, Accrington.

CHARLES HARRISON, Secretary.

Offices of the Company, Accrington, June 1, 1878

MACCLESFIELD CORPORATION GAS-WORKS.

CANNEL AND COAL CONTRACTS.

THE Gas Committee are prepared to receive TENDERS for the Supply of the whole, or partof, 4000 Tons of CANNEL, and 6000 Tons of GAS COAL; the deliveries to extend to Two years, from the 1st of August ensuing, free at Macclesfield, and in such quantities as may be ordered by the Manager.

Tenders, specifying the description of Cannel or Coal, the pits at which they are to be raised, and the terms for net monthly payments, to be sent in not later than June 22, addressed to the Chairman, Gas Committee, Town Hall, Macclesfield.

The Committee do not bind themselves to accept the lowest or any tender.

THOMAS MOORE, Manager.

May 27, 1878.

ROCHDALE CORPORATION.

TENDERS FOR PIPES.

THE Gas Committee of the Corporation invite TENDERS for the Supply of 200 Yards of 20-in. Cast-Iron GAS-PIPES, with Turned and Bored Joints, to be coated with Dr. Smith's process, and delivered free at Rochdale Railway Station.

Particulars as to weights, &c., may be obtained from the Engineer, Mr. Paterson, Gas-Works.

Tenders, endorsed "Cast-Iron Pipes," to be sent to me on or before the 18th of June inst.

By order,
ZACH. MELLOR, Town Clerk.

Town Hall, Rochdale, June 7, 1878.

ROCHDALE CORPORATION.

TENDERS FOR STATION-METER.

THE Gas Committee of the Corporation invite TENDERS for the Supply and Erection at their Works of a STATION-METER to pass 60,000 feet of gas per hour. Connections to be 18 inches, and the Valves and Bye-Pass to be Hydraulic. Tenders must be accompanied by a specification and tracings of the front and back elevations of the meter.

Mr. Paterson, the Engineer at the Gas-Works, will give all other information required.

Tenders, endorsed "Station-Meter," must be sent to me on or before the 18th of June inst.

By order,
ZACH. MELLOR, Town Clerk.

Town Hall, Rochdale, June 7, 1878.

OVER DARWEN LOCAL BOARD.

TO GAS ENGINEERS AND IRONFOUNDERS.

THE above Board invite Tenders for alterations to an existing SCRUBBER; also for one new Cast-Iron SCRUBBER, 50 ft. by 10 ft., with 16-inch Valves and Connections for both.

Particulars can be obtained, and plans and specifications seen, on application to the undersigned.

Tenders, endorsed "Tender for Scrubbers," to be addressed to C. Costeker, Esq., Law Clerk, Darwen, on or before the 1st of July next.

THOS. DUXBURY, Manager.

June 4, 1878.

BURTON-ON-TRENT GAS-WORKS.

CONTRACTS FOR IRON ROOFING, RETORT FITTINGS, PURIFIERS, AND OTHER APPARATUS.

THE Commissioners for Executing the Town of Burton-upon-Trent Act, 1853, are prepared to receive TENDERS for the Construction and Erection of certain Wrought-Iron ROOFING, required for the Extension of their Gas-Works at Burton-on-Trent, comprising Roofs of 52, 35, and 30 ft. spans or thereabouts; also for the Gas-Making and Purifying Apparatus, comprising 56 Retort Mouthpieces, and the Furnace Fittings and Ascension-Pipes connected therewith; two Hydraulic Mains; and other materials and apparatus.

Drawings may be seen, and specification and form of tender may be had, on application at the Office of Mr. Mudie, the Manager of the Commissioners Gas-Works, Burton-on-Trent, on and after Wednesday, the 29th day of May inst., and at the Office of Messrs. Thomas and Charles Hawksley, Civil Engineers, 30, Great George Street, Westminster, S.W., and tenders must be delivered to me at the Offices of the Commissioners, on or before 10 o'clock a.m. of Wednesday, the 12th day of June next.

The Commissioners do not pledge themselves to accept the lowest or any other tender.

By order,
T. N. WHITEHEAD, Clerk to the Commissioners.

Burton-on-Trent, May 18, 1878.

RADCLIFFE AND PILKINGTON GAS COMPANY.

TAR AND AMMONIACAL LIQUOR CONTRACT.

THE Directors of the above Company are prepared to receive TENDERS for the Purchase of the TAR and AMMONIACAL LIQUOR made at their Works, Egerton Street, Sion Street, Radcliffe, for a period of One or Two years, commencing from the 1st day of August next.

Tenders must state the price which will be given per Ton for Tar or Ammoniacal Liquor, separately or together; the purchaser to provide barrels and cartage from the Works, and the Company to fill them on the Works.

The purchase to be paid for monthly.

Tenders to be sent to the Manager and Secretary not later than Thursday, July 4, 1878.

By order,
JOHN BRANDWOOD, Manager and Secretary.

Sion Street, Radcliffe, May 24, 1878.

MANCHESTER CORPORATION GAS-WORKS.

AMMONIACAL LIQUOR.

THE Gas Committee of the Corporation of Manchester are prepared to receive TENDERS for the Purchase of the AMMONIACAL LIQUOR to be produced at their Gaythorn and Rochdale Road Works during a period of One or more years, commencing from the 1st day of January, 1880.

In addition to tenders for the purchase of the Liquor in its crude state, the Committee will also be prepared to consider TENDERS for its DISPOSAL, either by manufacture into Sulphate of Ammonia at the above-mentioned Works on their behalf, or in any other manner.

The Committee reserve to themselves the option of accepting the offer, the terms of which they may deem most advantageous.

They do not bind themselves to accept the highest or any tender.

Sealed tenders, addressed to the Chairman of the Gas Committee, Town Hall, and endorsed "Tender for Ammoniacal Liquor," must be delivered at these Offices, on or before Thursday, the 1st day of August next.

Forms of tender and further particulars can be obtained on application to Mr. George B. Jackson, at the Gas Offices. By order of the Gas Committee,
JOSEPH HERON, Town Clerk.

Town Hall, Manchester, May 31, 1878.

WILSON CARTER AND PEARSON,
GAS COAL AND CANNEL FACTORS,
Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.
Address—CHIEF OFFICES:
TEMPLE BUILDINGS, 50, NEW STREET, BIRMINGHAM.

ECONOMY IN THE PRODUCTION OF GAS.
PLUTONIC CEMENT,
For Jointing and Repairing Retorts and Ovens *in* action and *out* of action.
A Pamphlet on the advantages of the above, with modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,
WILLIAM RICHARDSON, GAS AND HYDRAULIC ENGINEER,
CHARLES HENRY STREET AND BISSELL STREET, BIRMINGHAM.

BRITISH ASSOCIATION OF GAS MANAGERS.

ANNUAL MEETING OF MEMBERS.

PROGRAMME OF ARRANGEMENTS.

THE

FIFTEENTH ANNUAL GENERAL MEETING

OF THE MEMBERS OF THIS ASSOCIATION WILL BE HELD ON

TUESDAY, WEDNESDAY, & THURSDAY, June 18, 19, & 20, 1878,

AT THE

SOCIETY OF ARTS ROOMS, JOHN STREET, ADELPHI,

LONDON.

CORBET WOODALL, ESQ., MEMB. INST. C.E., PRESIDENT,
Will occupy the Chair.

ORDER OF PROCEEDINGS.

TUESDAY, JUNE 11, a *pro formâ* Meeting only will be held at the Offices of the Association, at Eleven o'clock a.m.

TUESDAY, JUNE 18, 1878.—Morning Meeting.

The Chair to be taken at Ten o'clock.

Inaugural Address by the President. | Admission of New Members.
Reading of Papers and Communications.

Evening Meeting.

The Chair to be taken at Half-past Seven.

A Lecture will be delivered by THOMAS WILLS, Esq., F.C.S., on "The Products of Combustion."

WEDNESDAY, JUNE 19, 1878.

The Chair to be taken at Ten o'clock.

Reading of Papers and Communications, and the Transaction of other Business.
Election of Officers for the ensuing Year, &c.

At Six p.m. the Members and Friends will dine together at the City Terminus Hotel, Cannon Street.

Tickets for the Dinner, 7s. 6d. each, may be had from the Secretary, if taken on or before the 18th of June. After that date 10s. will be charged.

THURSDAY, JUNE 20, 1878.

The Members are invited to meet at the Phœnix Gas Company's Station, Kennington Lane, where the largest Gasholder at present in existence is in the course of construction. They will then be conducted to the Vauxhall Railway Station, and conveyed to Hampton. Here an inspection of the Works of the Grand Junction Water Company, and those of the Southwark and Vauxhall Water Company, will take place. They will then proceed to Bushey, where lunch will be provided. The Great Hall, Picture Galleries, and Grounds of Hampton Court Palace may then be viewed, after which the party will return to London by train from Hampton Court.

LIST OF PAPERS AND COMMUNICATIONS

TO BE SUBMITTED TO THE MEETING.

Report of the Committee and Proposed Alteration of Rules.

The Order in which the Papers are to be Read will be determined by the Committee prior to the Meeting, so as to suit the general convenience.

1. "Brick, Concrete, and Composite Tanks." By W. RICHARDS, of London.
2. "Transfer of Gas-Works." By A. PENNY, of London.
3. "Capital and Revenue." By G. LIVESEY, of London.
4. "Preventible Waste." By C. HUNT, of Birmingham.
5. "A New Standard for Determining the Illuminating Power of Gas." By J. METHVEN, of London.
6. "Some of the Causes tending to Retard the Application of Gas for Heating Purposes." By T. TRAVERS, of Cork.
7. "Some Experiments with Ammoniacal Liquor as a Purifying Agent." By F. LIVESEY, of London.
8. "The Correct Method of Analysis, and the Correct Valuation of Residual Gas Products." By G. E. DAVIS, of Manchester.
9. "Some Notes on the Construction of Retort-Settings." By G. E. STEVENSON, of Peterborough.
10. "The Purification of Coal Gas with Anhydrous Peroxide of Iron." By G. E. DAVIS, of Manchester.
11. "The Northern Coal Field, with especial reference to the Gas Coal District of Durham." By G. A. LEBOUR, of Newcastle.
12. "The Purification of Gas by Liquids." By F. D. MARSHALL, of Brentford.
13. "Cooking by Gas." By S. LEONI, of London.
14. "Improvements in Carbonizing Apparatus." By W. T. CARPENTER, of Sheerness.

June 4, 1878. WILLIAM H. BENNETT, *Secretary.*

MR. HENRY GORE,
CONSULTING GAS ENGINEER AND SCIENTIFIC REFEREE,
Begs to inform his friends in the Gas Profession that his Business Address in London, from and after this date, will be
No. 1, GT. COLLEGE STREET, WESTMINSTER, S.W.,
Where he can be seen by appointment any day between the hours of 10 a.m. and 3 p.m.

SILICATE THE BEST & CHEAPEST For every purpose to which Paint is applied.
MANUFACTURED IN ALL COLOURS BY **PAINTS.**
THE SILICATE PAINT CO.,
LONDON— 107, CANNON STREET, E.C.
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GRIRDROD'S PATENT PORTABLE PIPE SCREWING MACHINE,

For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.
In use at the chief gas-works, and giving great satisfaction.
For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.
W. H. BAILEY & CO.,
Brassfounders, Gauge njector and Tool Makers,
ALBION WORKS, SALFORD, LANCASHIRE.

JAMES NEWTON & SONS
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

MANN & OWENS
PATENT SCREW & CAM GAS-VALVES.
SIZES from 2 In. to 48 In.

As supplied to
THE GASLIGHT & COKE CO., LONDON:
The CORPORATIONS of MANCHESTER, BIRMINGHAM, CARLISLE, OLDHAM, STOCKTON, HALIFAX, &c.
And to the following Companies—viz.:
PHŒNIX, SOUTH METROPOLITAN, BRENTFORD, WINDSOR ROYAL, IPSWICH, WEST HAM, BILSTON, ARUNDEL, DUDLEY, ST. HELEN'S, MORECOMBE, THRAPSTONE, &c.,
And to the various WORKS of the BRITISH GASLIGHT COMPY.
Every Valve warranted perfectly Gas-tight.
SOLE MAKERS, S. OWENS & CO.,
ENGINEERS,
WHITEFRIARS STREET, LONDON.
PRICES ON APPLICATION.

TO INVENTORS AND PATENTEES.
MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
Patents procured for Foreign Countries.
Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

TO GAS-METER MANUFACTURERS.
G. A. BAILEY AND CO.,
MANUFACTURERS OF EVERY DESCRIPTION OF
Station, Hourly Rate, Experimental, and other Indexes, Wheel and Worm Cutters,
86, CRAMPTON STREET, NEWINGTON BUTTS, LONDON, S.E.
N.B.—Materials found or otherwise.

NOTICE TO MANAGERS OF GAS COMPANIES.

THE LAW UNION FIRE AND LIFE INSURANCE COMPANY, of No. 126, Chancery Lane, London, grants Policies of Insurance on Gas-Works, and Buildings connected therewith, which cover risk of explosion and spontaneous ignition of Coal, on very advantageous terms. Full particulars will be sent post free on application to

FRANK M'GEDY, Secretary.

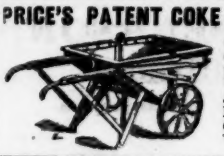
126, Chancery Lane, London.

A PAMPHLET ON DIP-PIPES, &c., post free 6½d., on application to W. WHITE, Gas-Works, Abersychan, Mon. See Reviews in the *Gas Trade Circular and Review*, March 29, 1878, and *Design and Work*, March 30, 1878.

PATRONIZED BY THE ROYAL ARSENAL, WOOLWICH.

FERGUSON, Builder and Contractor. Kite method of Repairing Church Spires and High Chimneys. Chimneys straightened, pointed, and hooped. Old Chimneys pulled down by a process requiring no scaffolding or stoppage of work, by competent workmen under personal supervision. For Lightning Conductors—cheapness and method of fixing—apply to C. R. FERGUSON, 12, Canal Road, MILE END.

PRICE'S PATENT COKE & COAL BARROW



effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

CLOTH GAS-BAGS FOR MAINS,

As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather, India-Rubber, and Gutta-Percha Machine-Bands, Sheet and Washers, and Steam Joints.

T. BUGDEN, Manufacturer,
107, GOSWELL ROAD, LONDON, E.C.

GAS COAL.

THE MIRFIELD COAL COMPANY are supplying GAS COAL of the best quality on trucks at their siding. This Coal contains 10 per cent. of Cannel, and, as analyzed by Mr. James Paterson, of Warrington, yields 12,600 *cubic feet of* 16·67 *candle gas*, with 1430 *lbs. of good Coke, per ton.* Ash in Coke, 1·88.

Apply to the MIRFIELD COLLIERY, Mirfield, NORMANTON.

THE BROUGHTON COAL COMPANY,
COLLIERIES, NEAR WREXHAM,

Are prepared to Supply their excellent GAS COAL on very favourable terms.

This Coal yields more than 10,000 cubic feet per Ton of gas of good quality, *in practical working on the large scale.*

A large purchaser reports the coke to be clear, of a quality rarely equalled in the retort-furnace, and much liked by the stokers.

W. LIDDALL,
Public Accountant,
15, UNION COURT,
OLD BROAD STREET, E.C.

Now Ready, price 28s., handsomely bound in Morocco, cloth sides, gilt edged and lettered,

THE FIRST VOLUME
OF
KING'S TREATISE
ON THE
SCIENCE AND PRACTICE OF THE MANUFACTURE & DISTRIBUTION
OF
COAL GAS.

EDITED BY THOS. NEWBIGGING, C.E., M.INST.C.E., AND W. T. FEWTRELL, F.C.S.

This Volume contains 460 pages of Letterpress, and is illustrated by 521 Woodcuts and 36 page and double-page Engravings, printed on Plate paper, and a full-page

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WELLS, BIRCH, RYDE, and CO., Limited,
HOYLAND SILKSTONE COLLIERIES,
Near BARNSLEY.

This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

Full particulars will be sent on application to above address.

METALLIC OXIDE PAINT,

Specially adapted for painting Iron and Woodwork in and about **Gas-Works**, as it is not affected by the ammoniacal gases always present, but will keep its **Colour and Hardness** under the most trying circumstances; it forms a very hard surface, and effectually prevents iron from corroding; it will not crack or blister, and resists alike the heat of summer and the cold of winter.

Used extensively throughout Lancashire, Yorkshire, and neighbourhood. Among our customers are the following:—The Manchester and Salford Corporations the Gas Companies at Rochdale, Sowerby Bridge, Halifax, Stalybridge, Blackburn, Leigh, St. Helen's, &c.

Supplied mixed ready for use, or in stiff paste.

J. E. WILLIAMS & CO., VICTORIA PAINT WORKS, COLLYHURST, MANCHESTER.

J. BEALE'S NEW PATENT GAS EXHAUSTERS
MANUFACTURED SOLELY BY
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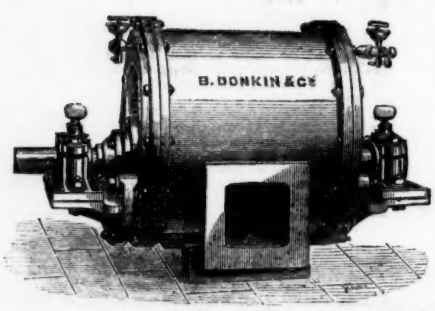

These Exhausters have but one solid slide, which ensures less wear and friction, and thus fewer repairs are necessary. They are made with two outside bearings and with all latest improvements.

MESSRS. B. D. & CO. ALSO MAKE

STEAM-ENGINES FOR DRIVING GAS EXHAUSTERS.
IMPROVED GAS-VALVES.
VALVES FOR AMMONIACAL LIQUOR, TAR, and HYDRAULIC MAINS
VALVES FOR SPECIAL PURPOSES, WITH COLUMNS, SCALES, AND GAUGES.
STEAM, GAS THROTTLE, AND BYE-PASS VALVES.
SCREW WATER-VALVES, &c.

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GREAT SAVING OF LABOUR.
ENOCH'S PATENT
PORTABLE DRILLING-MACHINE,

Now in use by all the Principal Gas and Water Companies in the United Kingdom.

E Size, for Services in Pipes, 2 to 3 in. bore £3 10 0
F Size, for Services in Pipes, 2 to 4 in. bore 4 0 0
G Size, for Services in Pipes, 2 to 6 in. bore, with Telescope Cramp. 4 10 0
Drills, 1s. 6d. each.

Machines sent on approval, if desired.

Prices for other Sizes and Modifications, with full Particulars and Testimonials, on application to

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GAS PURIFICATION.

BAILES & HALLSWORTH,
CONTRACTORS FOR THE
PURIFICATION OF COAL GAS
BY THEIR
PATENT HYDRATED PEROXIDE OF IRON MATERIAL.

The Material is adapted specially for taking up sulphuretted hydrogen, and will simultaneously absorb any ammonia that may pass the scrubbers.

The spent oxide resulting from our Material is more valuable than that from natural oxide of iron, and manufacturing chemists buy it in preference.

The Material has now been in use during the past three years in most of the principal Gas-Works in Yorkshire and elsewhere.

It contains considerably less moisture than natural oxide of iron, and is much cheaper and more efficient as a purifying agent.

B. & H. are purchasers of Spent Oxide, or will take Spent in exchange for New Material.

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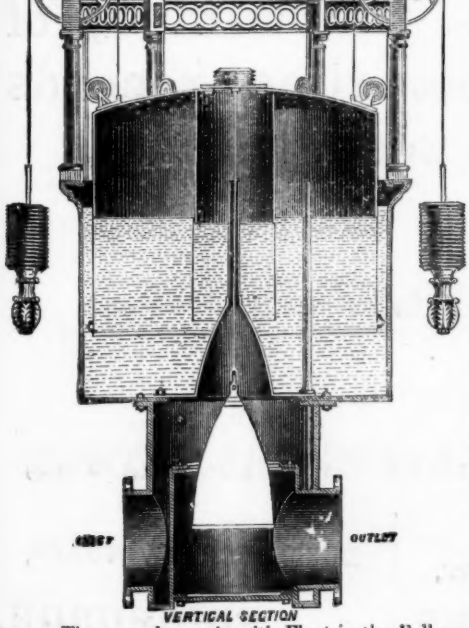
J. & J. BRADDOCK,
GLOBE METER-WORKS,
OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

CADZOW COAL COMPANY,
LIMITED.
Cadzow Collieries, Hamilton (Lanarkshire).
Office: 161, Hope Street, Glasgow.

Report on the Cadzow Ell Coal.

By Dr. W. WALLACE, F.R.S.E., F.C.S., Gas Examiner for the City of Glasgow.

I have made a careful chemical analysis and practical assay of an average sample of the Ell Coal from Cadzow Colliery, received on the 5th inst., from Messrs. The Cadzow Coal Company, Hamilton, and have obtained the following results:—

Analysis.

Volatile matters	Gas, tar, &c.	34·03	
	Sulphur	·04	46·12
	Water, at 212° Fahr.	12·05	
Coke	Fixed carbon	52·90	
	Sulphur	·03	53·88
	Ash	·95	
			100·00

Coke (dry) per ton of Coal, 1205 lbs., or 10 cwts. 3 qrs. 1 lb

Analysis of the Coke (Dry).

Carbonaceous or combustible matter	98·18
Sulphur	·06
Ash	1·76
	100·00
Specific gravity of the coal	1·250
Weight of a cubic foot in pounds	77¾

Practical Results.

Gas per ton of coal at 60° F. and 30 in. bar.	10,122 cub. ft.
Illuminating power in standard sperm candles by Argand jet, consuming 5 cubic feet per hour	16·76 candles.
Value of one cubic foot of gas in grains of sperm	402
Equivalent of a ton of coal in pounds of sperm candles	581
Durability of one cubic foot of gas by 5-inch flame	42 min. 45 sec.
Gravity of the gas, air = 1000	448

Remarks.

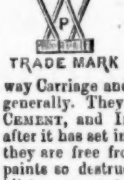
The sample tested consisted of a complete section of the seam, 5 ft. 6 in. in thickness. The results show that this Coal is well adapted for the manufacture of gas and coke, both being for soft coal of very fine quality. Of the many hundreds of coal samples I have tested, I have not hitherto had one with so small a proportion of ash as the Cadzow Coal.

WILLIAM WALLACE.
Chemical and Gas Laboratory,
133, Bath Street, Glasgow, March 15, 1878.

TORBAY AND DART PAINT COMPANY, LIMITED.

WORKS:
DARTMOUTH & BRIXHAM (TORBAY) DEVON.
OFFICES:
3, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

SOLE PROPRIETORS AND MANUFACTURERS OF
WOLSTON'S CELEBRATED
TORBAY IRON PAINTS.



TRADE MARK

These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Wagon Works, and the Paint Trade generally. They are the BEST PROTECTORS of WOOD, CEMENT, and IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to iron. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

The undermentioned colours—ground in best linseed oil, and requiring only to be thinned down for use in the ordinary way—are kept in stock:—

Torbay Brown.	Torbay Red.
Dart Green.	Slate.
Dart Yellow.	Buff.
Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
Dart Brown.	Dart Umber.
Imperial Stone.	Light Stone.
Bronze Green.	Salmon Colour.
Navy Green.	Lead Colour.
Carriage Red.	Dark Stone.
Light Lead.	Crystal Palace Blue.
Light Green.	Iron Grey.

All other Colours made to order.

READY-MIXED PAINTS.

A great variety of Colours ready mixed for the brush are also always kept in Stock, in 3 lb., 7 lb., 14 lb., and 28 lb. cans.

Prices and Testimonials on application.

WET GAS-METERS.

DRUM v. INDEX.

The index of a Gas-Meter records the number of revolutions made by the measuring drum.

The measuring drum ought, therefore, to pass the same volume of gas at every revolution.

The ordinary meter-drum, instead of doing this, varies in its capacity with every change of water-line. It is, therefore, out of harmony with the index, which is constructed for one capacity only. The

WARNER AND COWAN DRUM

has no such defect. It is a measure of practically fixed and unvarying capacity. The index which registers the number of its revolutions at the same time records the exact quantity of gas passed.

W. & B. COWAN,

(ESTABLISHED 1827,)

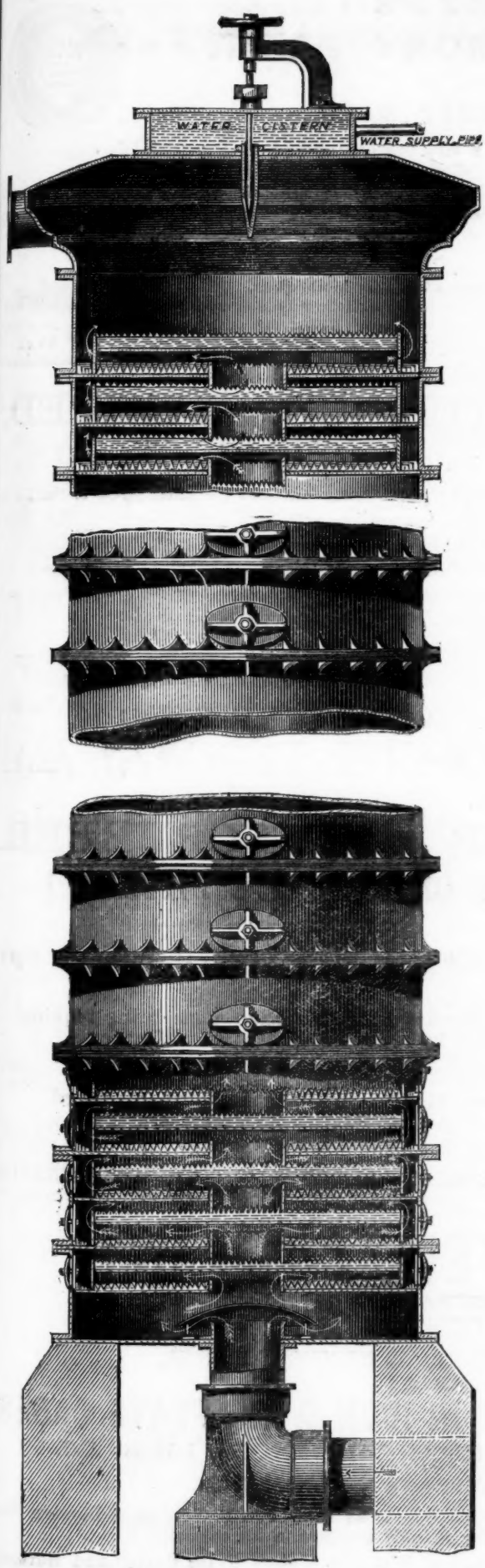
Original Licensees and Manufacturers of

WARNER & COWAN'S SELF-REGULATING GAS-METERS,

CHURCH STREET,
MILLBANK STREET,
LONDON, S.W.

DUTTON STREET,
NEW BRIDGE STREET,
MANCHESTER.

BUCCLEUCH ST. WORKS,
EDINBURGH.



SAMUEL CUTLER & SONS

CONTRACTORS FOR GAS & WATER WORKS,
GENERAL ENGINEERS, IRONFOUNDERS;
AND
MANUFACTURERS OF

Gasholders, Tanks, Purifiers,

SCRUBBERS, VALVES, EXHAUSTERS,

IRON ROOFS,

BRIDGES, BOILERS, AND GENERAL CAST AND WROUGHT IRON WORK.

S. C. & Sons undertake the entire Erection of New, or Remodelling of existing Gas-Works in any part of the World, including small Works for MANSIONS, FACTORIES, &c., or Works of the largest extent (are now constructing the largest Gasholder yet erected); also the Supplying and Laying of MAINS.

They make a speciality of supplying every requisite whatever for a Gas-Work, keeping in Stock what are most in request. WOOD SIEVES for Purifiers and Scrubbers, of a superior make.

SPECIAL CASTINGS to Drawing or Pattern at Shortest Notice.

MANUFACTURERS OF

CUTLER'S PATENT GAS-WASHER

AND

MORRIS & CUTLER'S PATENT CONDENSER.

(For Illustration and Description, see "Journal" for May 28, page 849.)

DESCRIPTION OF CUTLER'S PATENT GAS-WASHER.

The Washer consists of a vessel or tower of a cylindrical or other form, convenient to the site available for it. The interior is fitted with a number of dished trays arranged as shown, one above the other, from bottom to top. The flanges or sides of these trays are formed with serrated edges, and are arranged so that each tray contains a certain depth of water or liquor; the position and size of the serrated orifices in the dipping edges being such that the upper parts are slightly above the water, and so that the combined area of these small orifices is proportionate to the size of the inlet-pipe, the gas passing through without increase of pressure, and diffused in thinly divided streams. All the other edges are likewise serrated, so that the liquor passes over same in small streams, and so that the gas cannot pass through in bulk. The water or washing liquor is admitted at the top, the supply being governed by a conical needle regulating-valve so that the amount can be regulated to any desired quantity. The gas is admitted at the bottom and out at the top, the water or liquor descending the one meeting the other, and thus being brought into the very closest contact, and the gas consequently being deprived of its ammonia and other impurities absorbed by water or other liquor.

Where a slight increase of pressure is not of great consequence, we prefer to allow some of the lower tiers of trays to be slightly sealed, the better to arrest any tar or heavy oils that may have passed the condenser.

For further Particulars, apply to

S. CUTLER & SONS,

PROVIDENCE WORKS, MILLWALL,
(NEAR THE STEAMBOAT PIER,)
LONDON, E.

1862.

HALLETT'S
PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,
296, ROTHERHITHE, LONDON, S.E.

CLASS II.

This Paint having been in general use over sixteen years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known. Its advantages are that—

It does not require DRIERS like other Paints.

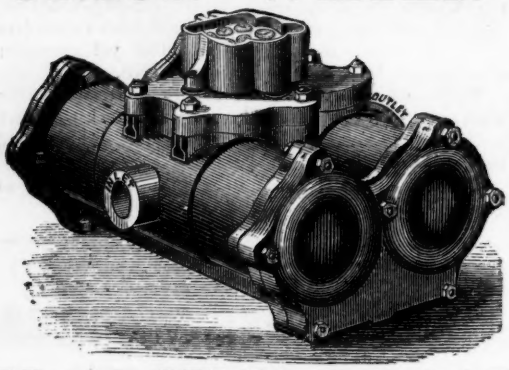
It does not poison the painter like white lead. No colic by its use.

It has greater durability in colour, as sulphurous gases do not blacken it as they do white lead.

It is of a light stone colour, and has a body equal to white lead, and as its specific gravity is so much less, it covers equally well one-third more surface, by which a great saving is effected; a similar economy arises from its use in steam and gas joints, for which purpose it is superior to white lead.

THE

UNION WATER-METER CO., LIMITED.



The above Company, having purchased the patent rights of the Union Water-Meter, are prepared to receive and execute orders for their Patent Positive Meters, which are simple and compact.

Upwards of 20,000 of these Meters are in successful operation in the principal cities of the United States, and have also been tested and approved by some of the leading Engineers in this country.

For Prospectuses, Prices, &c., apply to the

COMPANY'S OFFICES:

No. 4, NEW BROAD STREET, LONDON, E.C.

THE

STANDARD WASHER AND SCRUBBER.

[KIRKHAM, HULETT, AND CHANDLER'S PATENT.]

Some of the advantages claimed for this Apparatus are as follow:—

The Exposing of a large Amount of Effectually-wetted Surface (which is continually reproduced) to act upon the Gas.

Unerring Regularity in the Distribution of the Liquor.

Saving of Expense in Providing and Exchanging Scrubbing Material—none being required.

Economy of Space, thus enabling the Apparatus to be protected from the Weather.

Economy of First Cost and of Maintenance.

It works without Pressure.

It is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured.

Applications for Prices, &c., to be made to

Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER.

THE

IMPERIAL METER COMPANY,

LIMITED.

KING'S ROAD, LONDON, N.W.,

OFFICE: 115, VICTORIA STREET, WESTMINSTER, S.W.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

STATION-METERS AND GOVERNORS, STREET-LAMP METERS, BOXES, AND REGULATORS FOR THE AVERAGE METER SYSTEM.

Attention is called to their Dry Meters in Wood Cases, as used by the principal London Gas Companies. These Meters are especially suitable for seaport towns and for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

NOTICE.

THE GAS & WATER COMPANIES DIRECTORY, 1878.

(WATER SECTION.)

The Editor will feel greatly obliged if Secretaries and Engineers would fill up, and return to him at once, the forms sent them, as the work is now going to press. If any have not received Forms, they will be forwarded immediately, on application to the Editor,

CHARLES W. HASTINGS,
8, BUCKINGHAM STREET, ADELPHI, LONDON, W.C.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Invention

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

CANNEL COAL.

ELLIS LEVER & CO., Central Coal Offices, 46, Cannon Street, London, E.C., and 6, Piccadilly, Manchester, are prepared to contract for the supply of THE BEST CLASSES of CANNEL and GAS COAL, for long or short periods. Analysis and prices on application.

ELLIS LEVER & CO.,

CANNEL AND GAS COAL CONTRACTORS,

Shippers of Steam and House Coal

AT ALL

ENGLISH, SCOTCH, AND WELSH PORTS.

46, CANNON STREET, LONDON,

AND

6, PICCADILLY, MANCHESTER.

ALFRED LASS,

SPECIAL ACCOUNTANT FOR GAS COMPANIES,

30, GRACECHURCH STREET, LONDON.

Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by A. L. to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.

The above forms are registered.

Water Companies Accounts also prepared and adjusted.

CONSULTATIONS.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

MR. EDWARD SANDELL,

Associate of the Society of Accountants in England,
Publisher of the
"Gas Companies Expenditure Journal,"

Begs to announce his REMOVAL from Skinner's Place, Size Lane, to

No 2, CT. GEORGE STREET, WESTMINSTER.

Mr. ROBERT DEMPSTER, Sen.,

CONSULTING GAS ENGINEER,
Of Messrs. Robert Dempster and Sons, Rose Mount Gas Engineering Works,

ELLAND, near HALIFAX,

May be consulted on all matters connected with Valuations, Arbitrations, and Parliamentary Applications connected with Gas-Works. Our R. D., Sen., having been engaged on extensive Arbitration Cases, which, combined with his experience in Construction and Contracting, his knowledge of Engineering and Valuations, is both extensive and reliable.

REMOVAL.

CHARLES HEISCH, F.C.S., Analytical

and Consultimg Chemist, Superintending Gas Examiner to the Corporation of London, &c., &c., has REMOVED from 8, Savage Gardens, to 79, MARK LANE, where he may be consulted as usual.

JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER

AND

CANNEL COAL FACTOR,

30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c.,

SCOTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE.

Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

BIRTLEY IRON WORKS,

CHESTER-LE-STREET,
DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Consexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101 Cannon Street, E.C.

BOUCK & CO., LIMITED,

TAR DISTILLERS & MANUFACTURING CHEMISTS,

MILES PLATTING, MANCHESTER.

BRANCH WORKS, BLACKBURN.

BUYERS OF COAL TAR,
And Crude Products therefrom,
AMMONIACAL LIQUOR, &c.

WILSON'S SAFETY AUTOMATIC PRESSURELESS DIP-PIPE,

SELF-CLEANING HYDRAULIC MAIN.

See Illustration and Description in JOURNAL OF GAS LIGHTING, *Dec.* 4.

Improved SCRUBBER, with Self-Acting Water Distributor.

Improved HYDRAULIC CENTRE-VALVE to work three or four purifiers.

Improved HYDRAULIC LIFT, by which one man can raise and remove purifier-covers of any size.

Plans and specifications prepared for New or for the Remodelling of existing Gas-Works.

Special Designs for Gas-Works for Tropical Climates.

Particulars, &c., to be had of the Patentee, Inventor, and Manufacturer, W. P. WILSON, Consulting Engineer, 80, Cannon Street, LONDON, E.C.

C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

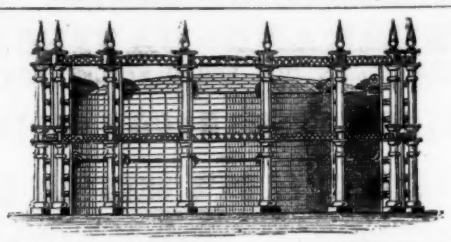
By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

HOPE IRON WORKS,



STOCKTON ON TEES.

ASHMORE & WHILE,

GAS ENGINEERS & CONTRACTORS,

MANUFACTURERS OF GASHOLDERS,

GAS APPARATUS OF EVERY DESCRIPTION,

Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

And GENERAL IRONWORK.

N.B.--Estimates for all Gas Plant and Remodelling supplied on application.

CATHELS'S Patent Gas-Washer is an excellent cleanser of gas from tar, ammonia, sulphur, and carbonic acid, reducing the cost of subsequent purification 30 to 50 per cent. Needs no motive power or attention beyond drawing off and recharging as required. Has no moving parts or complications to get out of order. Is of moderate cost, and is practically indestructible.

Application to be made to the MANUFACTURERS, the Horseley Company, Tipton, STAFFORDSHIRE.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

THOMAS LAMBERT & SONS

MANUFACTURE EVERY DESCRIPTION OF

GAS AND WATER FITTINGS;

ALSO,

WROUGHT-IRON TUBES & FITTINGS.

SHORT STREET, LAMBETH, LONDON.

YEO'S PATENT ENGINE PACKING,

Price 1s. 8d. per lb., any size.

Tarred & White Spun Yarn for Pipe Joints, at various prices.

Samples and testimonials free per post.

E. YEO, NEWTON ABBOT.

THE AMERICAN GAS-LIGHT JOURNAL.

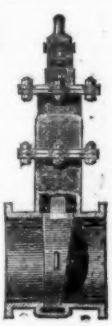
A. M. CALLENDER & CO., Proprietors. G. WARREN DRESSER, Editor.

Issued Semi-Monthly at No. 42 Pine Street, New York City.

This Journal is especially devoted to Gas Engineering and Manufacture, and is the official organ of the AMERICAN GAS-LIGHT ASSOCIATION, and the NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

Subscriptions at $3.50 per annum, post paid, to Great Britain, may be made direct by forwarding Post Office Money Order or Draft to the above address. Rates of advertisement, $2.00 an inch. Special rates for larger spaces.

C. & W. WALKERS' DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves have taken the place of the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.

MIDLAND IRON-WORKS,

DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

IMPROVED COMPENSATING GAS-METER.

HUNT'S PATENT.

This Meter supplies a want long felt, by putting an end to the loss sustained by Gas Companies through the overworking of their Meters.

These Meters can now be supplied in either TIN-PLATE or CAST-IRON CASES, and OLD METERS converted to this plan. GAS COMPANIES and CORPORATIONS will find it to THEIR ADVANTAGE to adopt these Meters.

EXTRACTS FROM REPORTS.

"I am able to report that the Meters have given in each test most satisfactory results."—*Mr. H. Sporne, City of London Meter Inspector.*

"I consider the arrangement is a great improvement upon the Meters in present general use."—*Mr. T. Jackson, Meter Inspector, Birmingham.*

"I would observe from the results of my testings that the Meters are a great improvement on the ordinary Wet Meters in general use."—*Mr. H. Airey, Meter Inspector to the Metropolitan Board of Works.*

COPIES OF REPORTS SENT ON APPLICATION.

MANUFACTURED BY

JOHN BENT & SON,

WET AND DRY GAS-METER AND GAS APPARATUS MANUFACTURERS,

BELL BARN ROAD, BIRMINGHAM.

Established 1830.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

198, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

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Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

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T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14½-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

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AGENT FOR

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NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

MIDLAND & YORKSHIRE COMPANY,

COAL OWNERS AND FACTORS,

Supply to any Railway Station the best descriptions of Gas Coal, Nuts, and Cannel.

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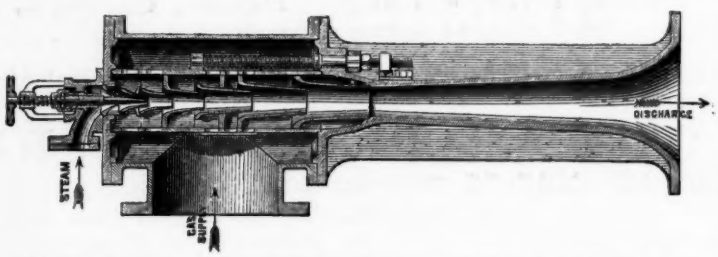

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Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

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THE DERBYSHIRE SILKSTONE COAL COMPANY, LIMITED,

CAN OFFER A

GAS COAL

Of superior quality, delivered in trucks at any Railway Station in England, or shipped on board at Hull, Grimsby Docks, or Barrow-in-Furness.

Purified gas per ton of coal in cubic feet (average)	**10,775**
Illuminating power in candles	**14·71**
Weight of coke in lbs. per ton of coal	**1,502**

ANALYSIS AND PRICES ON APPLICATION TO

Mr. EDMUND TAYLOR, Secretary,

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THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

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JAMES PATERSON Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

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The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

HYDRATED PURIFYING MATERIAL.

Samples on application.

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Will be glad to supply the above on the most favourable terms,

And to treat, by Purchase or Exchange, for Spent Oxide.

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CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

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Offices, Mersey Street, Warrington, April 23, 1877.

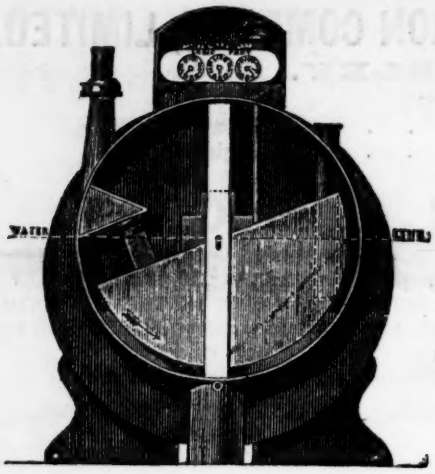
"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

"Yours truly, "JAMES PATERSON."

Full particulars will be sent on application to us—address as above.



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Over 120,000 in action.

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IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

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HYDRAULIC RAMS FOR LIFTING AND LOWERING PURIFIER COVERS.

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